

THE IRON AGE

New York, November 17, 1927

ESTABLISHED 1855

VOL. 120, No. 20

Automatic Charging of Cupolas

Push Buttons and Limit and Time Switches Control
Operation—Coke and Limestone Handled in Similar Way

BY H. A. JAHRAUS*

NOT only has the Buick Motor Co. put the process of making up charges of iron for the cupolas on a completely mechanical basis, but it has gone a step further and is delivering the charges into cupolas by means of four fully automatic charging machines. This apparatus, now operating in the new foundry at Flint, has materially reduced the time and labor required to keep the six cupolas producing.

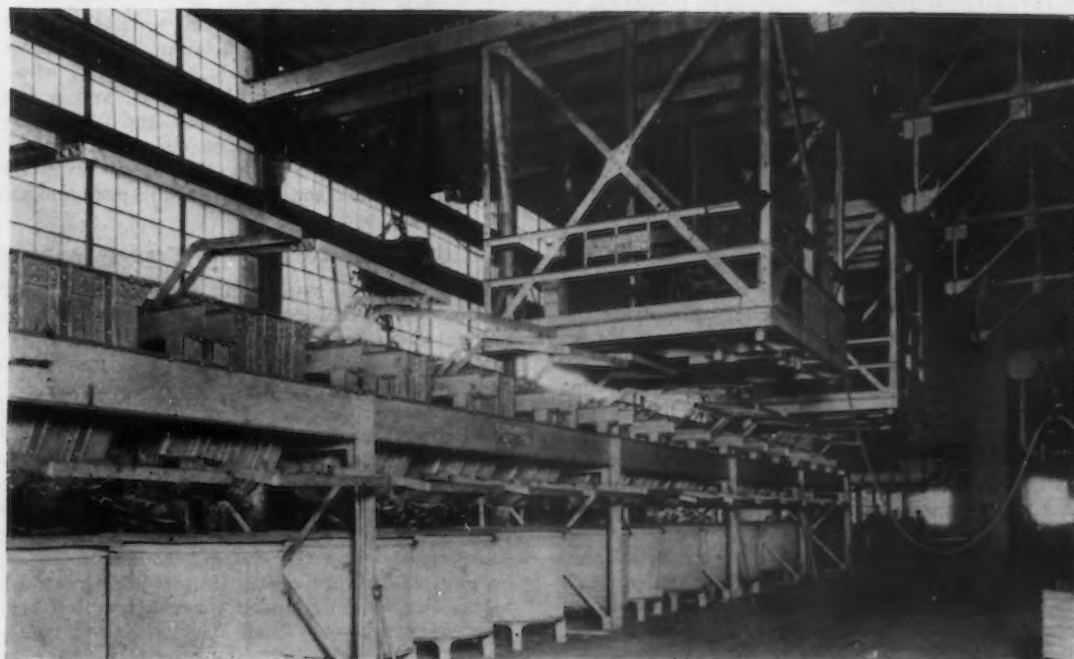
In every iron foundry the making up of charges of iron and delivering them into the cupola presents an important problem. The charge must be made up accurately, to keep the analysis of the product within specification. It must be put in the cupola at regular intervals, or the temperature of the pour will be difficult to control. It must be spread evenly over the bed of the cupola, or the melting zone will tend to become

cool on one side, cutting down the rate of melting. This work when done by man power is hard and disagreeable. The iron is heavy and dirty, and the cupola is hot.

To meet the above requirements in an efficient manner, the Buick Motor Co. has eliminated the dirt and the heavy lifting, and the man's exposure to heat. Making up a charge is now only a matter of manipulating electric controls in specially constructed cranes; and putting the charge in the cupola requires but a pressure on a push button, which starts an automatic charging machine on its cycle of operation.

The make-up cranes, which do the weighing and mixing of the charge, are in the main building on a line with the row of cupolas and parallel with the metal yard. They are shown in sectional elevation in Fig. 1. Just outside the building are the yard cranes, which deposit pig iron, scrap, steel flashings, etc., either from

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WHERE the Charge Is Weighed Into Buckets for the Cupolas. Electromagnetic hoist dumps the ingredients, in proportion by weight, into hoppers above the buckets. Buckets are then moved by high-speed electric trucks to hatchways, hauled up and dumped, entirely by machinery

cars or from the yard, on to the sloping chute shown in the diagram. The iron slides down the side of the chute and into the building, where it comes to rest. The various grades of iron are then in separate piles and within convenient reach of the make-up cranes.

Charge Is Mixed in Crane Cab

Each make-up crane consists of a motor-driven bridge carrying a large underhung cab, in which there is a weigh hopper and dial scale, a motor-driven trolley carrying an electric hoist and a magnet, and a trim hopper built into the floor of the cab. An interesting feature of the make-up cranes is that weighing and mixing are done in the cab itself.

The operation as shown in Fig. 1 is as follows: The scale dial is first set with markers at the desired weights of the elements of the mix. The crane is spotted at the bin containing the first grade of iron desired. The trolley is then run out over the bench, the magnet is dropped, a load is hoisted and carried

brake, necessary for accurately placing the crane when discharging, is within convenient reach of the operator. The crane is protected electrically by a standard panel switchboard with overload relays, placed at the rear of the cab.

Thirty Charges May Be Held in Reserve

As soon as the charge is made up complete, the crane is run to one of 15 clamshell type storage hoppers, which are set on a line directly under the weigh hoppers on the cranes. The charge is then dumped and held until needed. It will be noted that, with the 15 storage hoppers and 15 charging buckets, a reserve of 30 charges may be held, thus insuring that the charging of the cupola is not entirely dependent on the speed of making up the charge. The storage hoppers consist of two halves latched together and hung on trunnions, which in turn rest on coiled spring shock absorbers. The halves are opened by a positive toggle device, making certain that they empty completely when dumped.



Cupola Floor, with Charging Machine A and Bucket B. Five of the six cupolas may be seen

back over the weigh hopper, where it is dropped. If the dial reading indicates that another load is necessary the operation is repeated. The final trimming of weight is done by hand, pieces being taken from the trim hopper and thrown into the weigh hopper, or vice versa. Endeavor is made to keep about 2000 lb. of assorted iron in the trim hopper at all times. Each complete charge weighs 4000 lb.

The magnet, 45 in. in diameter, handles a load of 800 to 1200 lb., operating on about 230 volts, d.c. It is carried by a standard 3-ton electric hoist with dynamic lowering. The trolley is of the underhung low-headroom type, with Timken roller bearing wheels running on two 15-in. channels spaced 2 ft. apart. Spring bumpers are provided at each end of the bridge beams, to take up the shock in case the trolley should hit the end trucks of the bridge. In designing the trolley runway care was taken to keep the 15-in. channels entirely clear of the framework supporting the scale beams, that the deflection caused by the shifting of the trolley and load would not affect the accuracy of the scales.

The weigh hopper is made to withstand the repeated shocks of 2000 lb. dropping about 3 ft., which happens every time the magnet load is discharged. The hopper is therefore made of ½-in. plate with a ¼-in. wearing plate bolted on the bottom, and the whole reinforced with 5-in. tees. The bottom slopes off at 33 deg. to a side discharge gate, which puts most of the shock of the falling pigs on the bottom, rather than on the gate. The hopper is hung on four long 1-in. bolts with coiled spring shock absorbers. The hopper gate is self-latching and is opened by a foot pedal in the cab.

Electric controls for crane travel, trolley travel, hoist and magnet are located in the front right-hand corner of the cab, so that the operator may have an unobstructed view of the magnet at all times. A foot

Charging buckets, which stand on four legs, are placed on the floor directly under the storage hoppers by electric lift truck, and are removed by the same means, as needed by the chargers. The charging bucket shown in Fig. 2 is the Morgan conical bottom type, adapted for use in a cupola. It consists of a bell bottom with an eyebolt in the center, and a ¾-in. plate cylinder which rests on the bell and forms the sides of the bucket. The advantage claimed for this type of bucket is that the iron is spread out over the bed of the cupola when the bucket is dumped, and thus tends to keep the bed more level.

Charging of Cupolas Is Entirely Automatic

The charging equipment, shown in section in Fig. 2, consists of four Morgan automatic cupola charging machines and four transfer cranes. This arrangement makes it possible to charge the six cupolas three at a time on alternate days, holding one charger as a spare, or to charge four cupolas at the same time while two are being relined.

Referring again to Fig. 2, the cycle of operation is as follows: A bucket containing a charge is placed on the turntable by electric lift truck. The turntables, of which there are six, one for each cupola, are placed eccentrically with the charger, so that a bucket placed on one side of the center of the table may be rotated to position directly under the shaft and charger hook. The charger hook is then inserted in the eyebolt of the bucket and the push button starts the charging cycle. The impulse of the push button starts the hoist motor, which raises the bucket up through the shaft to the upper limit on the charging floor. Here it is stopped by a traveling nut type of limit switch geared to the hoist motor.

This switch at the same time trips a contact which

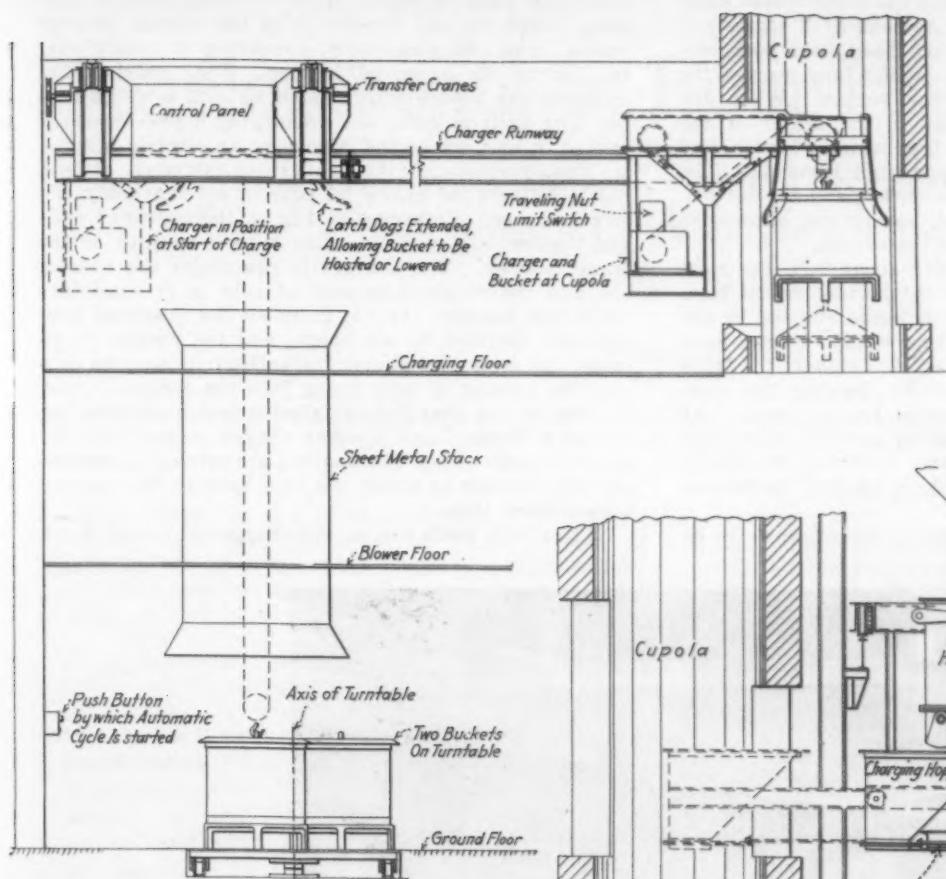
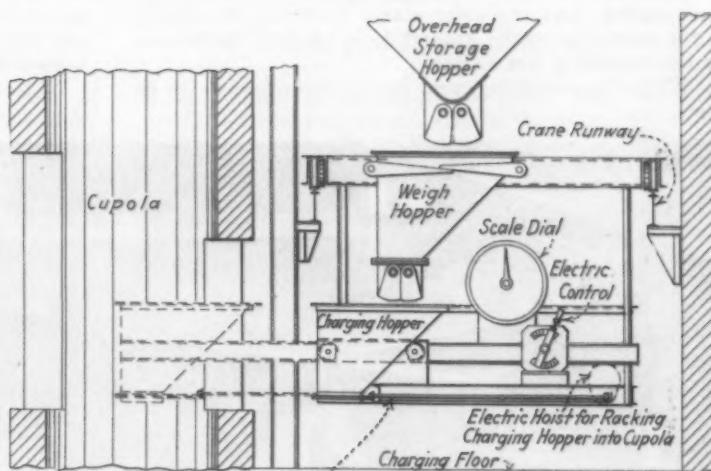


FIG. 3 (Left)
—Morgan
Charging Machine, Showing
Its Operation in
Hauling Buckets
of Metal Up the
Hatchway or
Stack and Running
Them Into
Cupola



Bolt which Utilizes Motion
of Charging Hopper for Opening
and Closing Slide Gate on
Bottom of Hopper

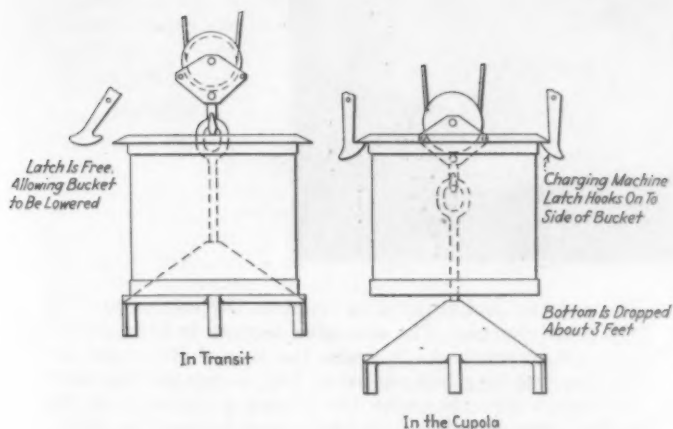
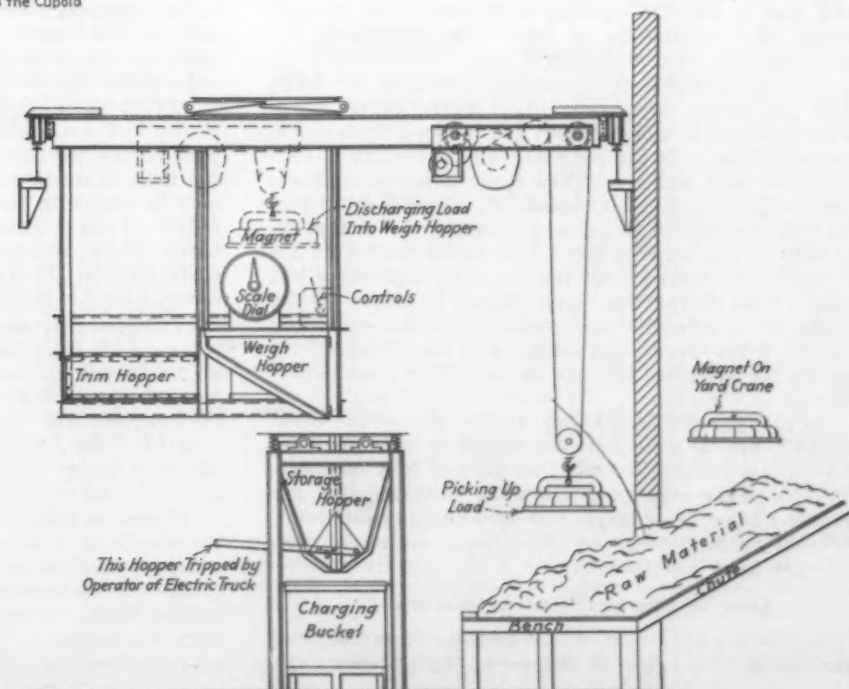


FIG. 4 (Above)—Coke Charger, Showing
How Coke from the Overhead Storage
Is Put Into the Weigh Hopper, Thence to
Charging Hopper and to Cupola

FIG. 1 (Right)—
Movement of Raw
Material from Yard to
Weigh Hopper, to Storage
Hopper and to
Charging Bucket

Fig. 2 (Above)—
Charging Bucket,
Showing How the
Latches Assist in Dis-
charging Contents



starts the crane travel motor and the crane moves down the track toward the cupola. As soon as it starts motion the latch dogs, which have been held open mechanically, drop to a vertical position and engage the beveled angle top flange of the bucket. When the charger has carried the bucket to the center of the cupola it is stopped by a track type of limit switch, and at the same time the hoist is started lowering. The latch dogs hold the shell of the bucket and the bottom, being separable from the shell, lowers and allows the charge to cascade to the bed of the cupola.

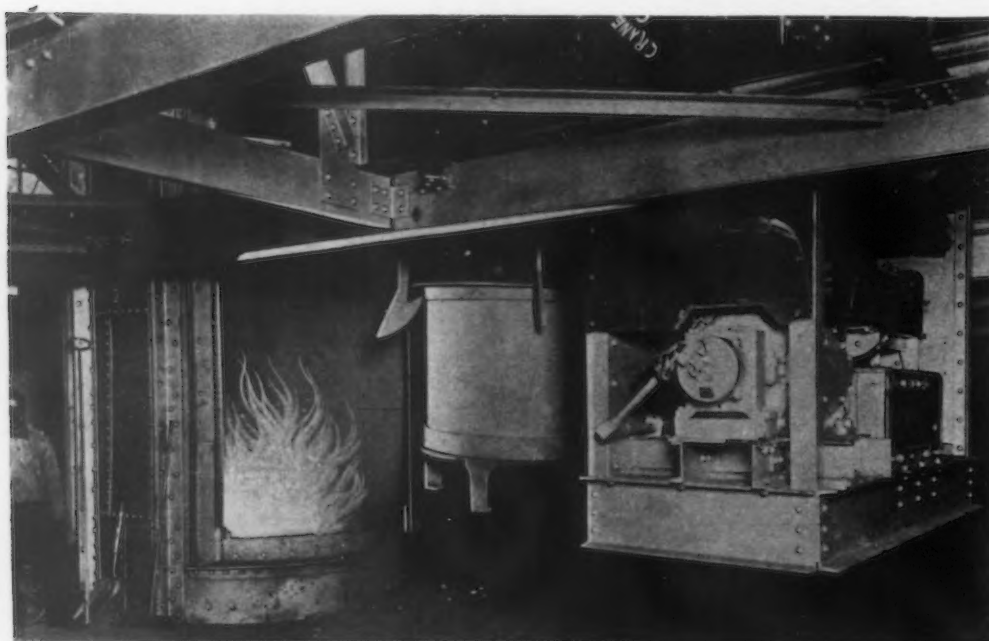
When the bottom has dropped about 3 ft. the hoist is automatically reversed and the bottom raised back to its former position, where it is again stopped by the traveling nut switch. The charger is then started back toward the shaft. As it approaches the shaft the latch dogs are thrown out mechanically, leaving the complete bucket shell and cone bottom free to lower. At the shaft the charger is stopped by another track type limit switch, and the hoist starts lowering the bucket to the turntable on the ground floor, where it is stopped by the traveling nut switch.

While the complete cycle is interlocked so as to be

coke, and also limestone, from overhead storage hoppers, weigh it, and deposit it in the cupola through special coke charging doors, spreading it evenly over the bed in the approved fashion. They consist of a motor-driven bridge with underhung cab, a weigh hopper with built-in scale, and a charging hopper which is racked in and out of the cupola by an electric hoist.

The operation of the charger is extremely simple, but it delivers the charge of coke in a remarkably efficient manner. Referring to Fig. 4, the overhead storage hoppers are seen on a line with the center of the crane runway. The charger is run under the nearest one and the required amount of coke is dropped into the weigh hopper. As the gates on the overhead hoppers are operated by air hoists, and the weight shows up on the scale dial almost instantly, it is easy to control the amount of coke going into the weigh hopper. As soon as one charge is weighed it is dumped into the charging hopper, and another charge is run into the weigh hopper. Thus two charges are carried to cupolas, and the charger is saved one trip back to the storage hopper each time.

After both loads are in, the charger is moved down



***C** HARGE of Metal About to Be Introduced into a Cupola. The latch shown at entrance to cupola door supports the walls of the bucket and permits lowering of the bottom to discharge contents*

entirely automatic, it has two complete electrical circuits so that, by throwing a knife switch, the automatic feature is cut out and a complete set of manually operated controllers is ready for use. When the empty bucket reaches the turntable it is rotated out of the way and a full one swung into place, and another charge may be sent on its way. The time taken for each charge is approximately 2 min.

The advantages of automatic charging on large scale production are apparent to every foundryman. A considerable number of men are released from a disagreeable job, costs are reduced, and the quality of iron poured is held uniform. The most important advantage is that the human element is eliminated. From the time the button is pressed, starting the charge on its way to the cupola, until the empty bucket is returned to the ground floor, the charging machine is left alone. This means that each charge is placed in the cupola in exactly the same manner as the preceding one. In other words, the charging is controlled by adjusting the machine, and not by depending upon supervision.

In the process of making up the charge it would probably not be practical to attempt to put any part of it on an automatic basis. In fact, it is a considerable step ahead even to do the work mechanically. On the other hand, the charging of coke adapts itself readily to an automatic feature which was used in the coke chargers described below.

Coke Is Charged Semi-Automatically

On the opposite side of the cupolas from the iron chargers are the two coke chargers. These receive the

the runway and stopped in front of the cupola needing the next charge. The charging hopper is then racked into the cupola. As it nears the end of its travel the head on the long bolt shown in Fig. 4 engages the channel shown directly under the charging hopper, and the bolt is stopped. The bolt being attached to the sliding gate on the bottom of the hopper, the gate is pulled open as the hopper advances, and the coke cascades out during the last part of the travel.

As the gate is made twice as wide as the length shown in the diagram, the coke is distributed in a wide path across the cupola. The length of travel and also the time of opening the gate being adjustable, the coke may be placed in the desired spot, which is around the center of the cupola. When the coke is dumped, the travel of the charging hopper is stopped by an automatic switch. It is then run back into the cab of the crane, where it is stopped by the same means.

The charging hopper is framed into two channels one on each side, facing outward, which form its runway. In the cab of the charger are four stationary flanged wheels, which fit closely between the flanges of the channel, one pair taking the upthrust of the runway when the hopper is in the cupola. The runway is fastened to two cables on the electric hoist, by means of which the racking is accomplished.

It will be seen that, once the proper adjustment of the operation is obtained, the coke will be placed in the same manner in the cupola at all times. And this fact brings the realization that, in the charging of coke as well as in the charging of iron, the human element has been eliminated to an extent never before reached in an iron foundry.

Developments in Four-High Rolling

Mill and Roll Design Matured Rapidly—Roller Bearings a Large Factor—High Tonnage Output

BY F. C. BIGGERT, JR.*

UNTIL somewhat over a year ago progress in the rolling of strip steel had practically come to a standstill. Existing mills had succeeded in hot rolling strip up to about 24 in. wide by 12 gage, and narrower widths as thin as 16 or 18 gage. Some material may have been made thinner than 12 gage in widths approaching 24 in., but I believe that the widths and thicknesses stated above represent the best commercial accomplishments of the time.

If wider material was to be rolled, it was evident that fundamental changes in mill construction must be made, since increasing roll diameters, with the inevitable increase in neck friction which they imply, had about reached the practical limit. The use of roller bearings was naturally considered, but no bearing could be designed which would support the required load and be small enough to assemble in the two-high mills then in use.

Large Four-High Plate Mill

We had built the 206-in. plate mill at Lukens Steel Co., and in it we used the four-high mill, not so much to reduce power consumption as to limit the size of the chilled working rolls to dimensions within the facilities of chilled roll makers. This mill had been successful and had demonstrated the possibilities of the four-high type as a means of producing wide and relatively thin material of exceptionally accurate gage. That is to say, this plate mill had been found capable of rolling plates as thin as $\frac{3}{8}$ in. in widths up to 16 ft. and having a uniformity of gage from edge to center quite as good as had previously been produced in ordinary widths. The life and behavior of the rolls were remarkably good. No spalling occurred and the medium carbon steel backing rolls maintained their shape well.

Some difficulty with fire cracking of the chilled rolls occurred, due to the very large ingots used and the slow and heavy drafts in the early passes. But it was evident that, with slabs such as would be used in strip mills, this would not be serious.

Considering the possibilities of wider strips in the light of this plate mill experience, we concluded that

the same type of mill offered the means required. There were difficulties, however.

Power Cost and Roller Bearings

In rolling thin material, the power cost becomes a matter of importance, and, while the four-high mill is inherently more efficient than the older types, yet if run on ordinary bearings, the power per ton would still be rather high.

A large and expensive installation rolling thin material must deliver at high speed if tonnage, commensurate with the installation cost, is to be obtained. With ordinary bearings, this would involve excessive heating.

On thin material a mill must maintain its setting much more accurately than in ordinary rolling. The wear of ordinary bearings, which, in thick rolling, is of small importance, becomes vitally important when the thickness approaches $\frac{1}{16}$ in.

All these difficulties could be overcome if roller bearings could be obtained capable of sustaining the loads involved.

Our engineers had developed the requirements thus far and had made some inquiries indicating that suitable bearings could be obtained, when we were called to the plant of Rome Brass & Copper Co., Rome, N. Y., to advise with that company as to means of improving its practice in producing sheet copper. Having studied copper rolling practice, with which we had previously been entirely unfamiliar, we concluded that the four-high roller bearing mill met the requirements completely.

The question of roller bearing design was discussed with W. Messinger, Philadelphia, an outstanding authority in this field. Having determined sizes which, upon rather meager data, appeared to meet the requirements, a mill was built. It has proved satisfactory.

Demand for Wide Strip Mill

This mill had scarcely started and was still in a highly experimental state when Columbia Steel Co. came into the market for a steel strip mill to roll 30-in. wide material down to 12 gage; afterward changed to 36 in. wide by 12 gage.

Here was a chance to try out the four-high principle in a big way, but we were poorly prepared, having still only imperfect data on which to base designs. We decided to make a clean breast of the matter and see if Columbia would go along with us in a large scale experiment. The allurements were great and we convinced the company that the experiment was worth making. A universal roughing mill was installed, followed by four stands of four-high hot mills arranged in tandem and five stands of similar cold mills. The E. W. Bliss Co. supplied the cold mills.

Generally speaking, these mills have been successful, although bearing troubles have been encountered to some extent on the hot mills. This is primarily due to rolling 14 and 16-gage material, in which case the steel is too cool when it is delivered to the finishing train. A universal mill is not fast enough for a strip mill rougher where the gage to be finished is thinner than No. 12. Sheets as wide as 36 in. and down to 16 gage are being produced on the mill, but changes will be required before this can be done satisfactorily. As



F. C. Biggert, Jr., several of whose papers have been printed in THE IRON AGE. "Waste in Industry" appeared July 7 and "The New Wage Doctrine" Sept. 1. "Problems of Too Much Plant Capacity" was published March 10, 1927

*President United Engineering & Foundry Co., Pittsburgh. This is a paper read before the Iron and Steel Division of American Society of Mechanical Engineers, Youngstown, Ohio, Nov. 10.

the mill now stands, 12 gage by 36 in. wide is its commercial limit.

Acquiring Reliable Data

Before the Columbia mill design was well started, Weirton Steel Co. decided to install a tandem train of nine hot mills and two five-stand trains of cold mills, to roll 48 in. wide. The experiment was getting too hot for us and we insisted that reliable data be obtained before proceeding with designs.

Pressure-measuring devices and also devices for measuring neck friction in ordinary strip mills were devised, built and applied. From these devices we obtained remarkably consistent data upon which to base both bearing loads and motor powers.

The Weirton hot mills have now been in operation for some three months, and so far neither bearing nor roll troubles have appeared. Widths up to 38 in. have been hot rolled to 16 gage commercially, and 36 in. wide 17 gage has been produced experimentally.

Other steel companies have taken up this new type of mill, also. Lukens Steel Co. has an 84-in. plate mill built among the first. Trumbull Steel Co. has remodeled a 16-in. mill, using five stands of four-high in the finishing train, and has thus increased its capacity from 18-in. to 30-in. widths. A further change in the roughing train will permit rolling 36 in. wide. Youngstown Sheet & Tube Co. has a single stand with 72-in. rolls. American Sheet & Tin Plate Co. is installing six stands which will be referred to later, and there are numerous others. Some 80 stands of four-high roller bearing mills, hot and cold, have been contracted for within a period of less than two years, indicating the remarkable interest aroused by the development.

Two Methods of Finishing Available

Just what will be the outcome of this development is difficult to say. There are the two distinct fields of hot and cold rolling to which the mill is eminently suited. In hot rolling, it is safe to say that 16 gage is near the practical limit, although American Sheet & Tin Plate Co. propose to go to 18 gage by 28 in. wide, and will doubtless accomplish this.

Leaving the hot mill at 16 or 18 gage, we have the choice of further reduction through cold strip mills or by packs on ordinary sheet or tin mills.

Both of these methods probably have their field of usefulness. For very light gages, particularly tin plate, it may be that the hot pack will prove most economical. This is the method being tried out by American Sheet & Tin Plate Co., and it will surely reduce the cost as compared with present-day practice.

Down to 24 or 26 gage, particularly for full-finished and similar bright stock, there seems little doubt that the cold strip process is best. The operation of these cold mills is just beginning. At present we do not know either the minimum thickness or the maximum speed which may be commercially obtained. Until these factors are determined, it will be impossible to decide which process will survive.

Surface Considerations

Another factor of importance is the question of coating. We are not yet sure that the cold rolled material will take a satisfactory coat of either tin or spelter. But the probability is that, by suitable preparatory processing, such coatings may be applied.

Where feasible, the cold strip process seems to have great advantages. Labor is much reduced; crop losses are almost negligible; pickle cost is from one-half to one-fourth of that for the pack process; frequently it will be advantageous to have the finished material in strip form rather than in sheets, and the remarkable accuracy of gage should increase the demand for strips.

On the whole, we are disposed to believe that reduction by the cold process will ultimately prove to be the economical method of producing the large tonnage gages, perhaps including tin plate.

Exceptional Accuracy Attained

The accuracy of rolling with these mills is quite remarkable. It is not difficult to hot roll strips 250 ft. long, 30 in. wide and 1/16 in. thick, with edge to center and end to end variation within 0.003 in. At Weirton this degree of accuracy has been exceeded in regular

production. I have personally calipered coils 36 in. wide by 0.080 in. thick which showed only 0.002 in. edge to center variation. But this practice has been abandoned and about 0.004 in. fullness is being allowed, on account of the difficulty of handling the more accurate coils in the cold mills. There is much less difficulty in cold rolling if the metal has an appreciable fullness at the center.

The practice in the hot mills is to start with a 3-in. thick slab, regardless of the finished gage, and, with suitable edging equipment, an excellent edge is produced on the finished strip. The edges are somewhat rounded but very straight and smooth, so that even for the most exacting sheet requirements it will suffice to side trim only about 1/4 in. The length of strip is so great (200 to 400 ft. hot rolled and 300 to 1200 ft. after cold rolling) that end crop loss becomes almost entirely negligible.

Heavy Tonnage Output Possible

A hot mill arranged like that at Weirton can easily produce 40 gross tons an hour of 30-in. wide, 16-gage material. The theoretical discharge of this material at the usual finishing speed of 800 ft. a minute is 135 tons an hour. Hence placing the average production at 40 tons is doubtless conservative.

The possibilities of the cold mills are not so well established, but it is fairly well proved that a delivery speed of 200 ft. a minute can be maintained and that a reduction of 60 per cent in thickness can be obtained in a four-stand train.

If then we start with 16-gage 30 in. wide, we may reduce to about 24 gage which, for 30-in. wide material delivering at only 150 ft. a minute, amounts to a theoretical discharge of 10 tons an hour. Cold mills can be run on a high production factor on account of the great length of entering piece, so it seems safe to say that such a train should produce eight tons an hour of this material. This rate of production has been exceeded for short periods, and seems a conservative estimate, especially when we remember that there is good probability of attaining speeds higher than that assumed.

Power consumed per ton of product has not yet been well established, because all the mills now in operation are running intermittently and under adverse operating conditions. Such data as are available indicate a power requirement about one-half that used in ordinary strip mills for corresponding sizes. On 16-gage material reduced from 3-in. slabs, we believe 80 kwhr. a ton is a safe figure for hot rolling. Reducing 60 per cent cold, from hot rolled material of 12 to 16 gage, will require about 30 kwhr. a ton.

Comparison with Sheet Mills

Ordinary production of sheet mills is one net ton an hour per mill. On 24-gage sheets, we may allow one gross ton an hour as a monthly average per mill.

On this basis, and that of the figures previously quoted for hot and cold strip mills, we may assume that one hot strip mill, such as those at Weirton or Trumbull, with enough cold mills to reduce its product from 16 gage to 24 gage, will be equivalent to 40 sheet mills.

But the sheet mills require sheet bar as their raw material, whereas the strip mill takes slabs which come direct from the blooming mill.

To make a true comparison, we must, therefore, place one hot strip mill, with its complement of cold mills, against 40 sheet mills and a good sheet bar mill. The two plants will cost about equal amounts and should produce equal tonnages.

To Make Tin Plate

The problem of producing tin plate and sheets of corresponding thickness, by the new methods, is particularly interesting and the American Sheet & Tin Plate Co. is to be congratulated upon the steps taken in this direction. The scheme is to reduce to about 18 gage in a four-high strip mill, and match, double and finish on existing tin plate mills. The entire roughing operation is thus transferred to the high-production strip mill. Scrap loss should be reduced because of the very accurate dimensions of the pack at the doubling point, and finishing mills may be run at a higher rate because of the reduced roll heating.

Incidentally, the company has burned no bridges, since the hot strip mill will be equally well adapted to roughing for cold mills, should it later be found economical to finish cold.

So much for the historical and economic side of the development. From an engineering standpoint, the following may be of interest.

Engineering Features and Design

WE have used roller bearings of the parallel roller type on the backing rolls, because we believed this type most suitable to the extreme loads to be carried. We do not know that this is true, but it is to be remembered that, in starting this development, we were working in the dark. Speed, load and available space for assembly considered, these bearings carry several times the load of any roller bearing previously used. Not only is the duty required greater than has been previously demanded of bearings of equal dimensions, but also the manufacture of such large sizes had been, by no means, standardized. On this account, we doubted the applicability of formulæ of roller bearing manufacturers, and were forced to rely largely upon our own analysis, in determining both the sizes and type of bearings.

The results of practice so far have been fairly satisfactory. On cold mills we have had no trouble, as the loads may be calculated with fair accuracy. Some of the earlier hot mills have given trouble which has been traced to two important sources. First, excessive loads due to rolling cold steel; second, unavoidable stresses due to cobbles, broken rolls and similar accidents.

Exceptional Pressures May Be Met

The increase in rolling pressure due to cold steel may easily double the load on the bearings. For instance, at Weirton, measurements taken at the beginning of a run, when the first few slabs were not well heated, as compared with corresponding measurements a few minutes later, showed pressures in the ratio of 4 to 2½, and the cold slabs were only about 100 to 200 deg. low in temperature.

There is no means for measuring the momentary pressures due to accidents, but it is obvious that they will increase the demands upon the bearings.

Neither of these occurrences causes immediate failure of bearings, but their repetition may ultimately result in failure. Good safety factors, combined with good heating and good mill practice, are necessary to obtain good bearing performance.

Bearings and Roll Sizes

Working roll bearings used so far have been ordinary mill-type bronze. The loads on these bearings are theoretically small and, when the rolls are properly alined, they are practically quite small. Since specially good alinement is necessary if good rolling is expected, regardless of bearings, and since the rolls, once properly alined, have little tendency to change their position, there is little need of more refined equipment.

Roller bearings have been suggested for the working rolls. But the small advantage, difficulty of assembly, cost and almost certainty of destruction every time a roll breaks, has prevented our recommending them.

Sizes of working rolls have been determined from the size of coupling necessary to transmit the required torque. We have based our designs upon elaborate full-sized tests to destruction. Backing rolls have been made of sufficient diameter to accommodate the required bearings, as this usually gives a roll of ample stiffness.

Power Independent of Roll Diameter

An interesting development in regard to working roll diameter is that it has no appreciable effect upon the power consumption of the mills. This is, of course, contrary to all previous conceptions. But tests over a wide range of diameters have shown that, for like reductions, the power per ton is almost exactly constant.

Of course, the rolling pressure increases with increasing roll diameter and, with ordinary bronze bearings, the larger necks absorb more power. This is the reason that, in ordinary mills, the power per ton increases with increasing roll diameters. The friction coefficient of roller bearings is in the order of 0.0009,

and consequently the power absorbed by necks is so small that it has almost no effect upon the total power consumption.

This is important, since it removes the principal argument for minimum diameter working roll, and permits the use of rolls large enough to stand severe accidental stresses.

No Displacement of Rolls in Rolling

Another prevalent idea that has been disproved is that the rolls of a mill tend to move out of the housings in the direction of the movement of the material. The fact is that, with equal diameters of top and bottom working roll, there is no tendency to move with the piece. But there is a back pull toward the entering side, just sufficient to pull the material into the mill.

If the material is carried on roller tables moving at the same speed as the mill this pull is zero. In no case can it be more than the friction due to the weight of the material. This may be demonstrated by putting exactly equal rolls in any two-high or four-high mill and examining the lost motion of the chucks. They will be found usually to bear against the housing post on the entering side, and may be displaced by a slight pressure applied between chuck and housing.

This is not true when the rolls are of unequal diameter, nor in the case of a three-high plate mill where the middle roll is friction-driven from top or bottom rolls.

Backing Rolls Offset from Working Rolls

In the four-high mills, it has been found advantageous to set the working rolls a small distance off center from the backing rolls. Usually this has been toward the delivery side, although they seem to work about equally well if offset toward the entry side.

We do not know any good reason for this displacement unless it be that it definitely establishes the direction in which the rolls will settle when the piece enters. If they are exactly on center, small unavoidable differences in diameter, or other inaccuracies, may cause one end to settle backward and the other forward; whereas, by giving a definite offset, they must settle uniformly. Whatever the reason, mill operators find it convenient to offset the rolls as much as ¼ in., and obtain more uniform results by so doing.

Roll Material Considered

In the hot mills, after experimenting with rolls of various composition, it appears that fairly high-carbon alloy steel backing rolls and chilled alloy iron working rolls will give the best results, although ordinary mild chill working rolls have given good service where it has been possible to finish at proper temperature.

The cold mills have worked well with medium-carbon steel backing rolls and hardened steel working rolls. Ordinary chilled backing rolls, also, have given good service, and, on cold mills, it appears that any reasonably hard roll will serve for the backing rolls.

On both hot and cold mills, the experience available is not sufficient to warrant a definite statement as to the best combinations of working and backing rolls. But it is evident that rolls can be made which will give commercially acceptable service.

Enough has been said to show how very far-reaching may be the effect of the introduction of these mills into the art of producing wide flat metal products, and to give some idea of the problems involved in their design.

Desirability of Cooperation, Rather Than Competition, Stressed

IN his discussion of Mr. Biggert's paper, R. J. Wean, vice-president Aetna-Standard Engineering Co., Youngstown, dwelt on the commercial aspect of the new mill and stressed the desirability of coordination of the wide strip and sheet mills, instead of competition, which he said had made unprofitable the products of both types of mills. He said:

"There is no question that steel in long lengths and in widths up to 42 in. can be rolled on hot mills of this kind. But, when this product has been produced, it still remains in the form of hot strip steel. It is necessary to subject this to various finishing processes to

impart the finished and physical properties required by the uses to which sheet steel is put. As these uses differ widely and are numerous, the sheet steel industry is an industry of specialties.

"Installation and operation of continuous four-high mills has affected the sheet steel market to such an extent that selling prices are much lower than they should be for either the sheet steel producer or the producer of wide strip steel. They have been competing in the same market, whereas it appears that they might serve each other to supply the same market on a non-competitive basis.

Suggests Independent Finishing of Rolled Wide Strip Steel

"Would it not be better for the producer of wide strip steel to furnish the sheet steel industry with material rolled down to 12, 14 or 16 gage in the form of hot strip steel, and permit the experienced sheet steel man-

ufacturer to finish this material into the various grades required by the sheet consumers? In this way there would be sufficient tonnage available for the wide strip steel operator to keep his mill in continuous operation, and still make use of the existing sheet steel finishing capacity in this country.

"This same application can be made to the manufacture of tin plate, as witnessed by the installation of one of these mills for the production of tin mill break-downs alone. The potential market for this material in the tin plate industry can be well realized from the total production of tin plate in the United States—in 1926, about 40,000,000 base boxes.

"Surely the development of this market is worth considerable thought. The cooperation of the wide strip producer and the sheet steel producer would not only work out to the economic advantage of both, but to the entire steel industry as well; and most certainly to the stockholders who have invested their money in these properties."

Refractories and Four-High Mills

Important Topics Engage Engineers at Youngstown Meeting—Lack of Profits in Steel Industry a Nut to Be Cracked

STANDARDS for interest and attendance and for the character of papers, to say nothing of the men of distinction in the iron and steel and engineering worlds who were present, were established by the recently organized iron and steel division of the American Society of Mechanical Engineers, at its first meeting, held at the Ohio Hotel, Youngstown, Nov. 10. If there is one topic of discussion in the steel industry that stands out more than others, it is the four-high continuous wide strip mill. And this gathering had the privilege of hearing from men who have been intimately associated with its development with regard to its engineering details.

There was one other formal paper of the technical session, on super-refractories. This is another subject of timely interest, in view of the tendency of the iron, steel and power industries to push furnaces and boilers to the limit of their capacities, with the consequent raising of the service demanded of refractories. The general trend of the paper and its discussion was to point out what the refractories industry has done and is trying to do in the solution of the problem created by the more exacting demands of consumers. The author and those who discussed the subject stressed the futility of refractories manufacturers alone trying to find the answer to such difficulties as had arisen, and urged the cooperation of consumers.

The afternoon was devoted to visiting the Campbell works of the Youngstown Sheet & Tube Co.; the Hazelton and Bessemer works of the Republic Iron & Steel Co.; Ohio works, Carnegie Steel Co.; and the plants of the Truscon Steel Co. and the General Fireproofing Co.

The informal dinner at the Ohio Hotel in the evening, featured by talks by James A. Campbell, president Youngstown Sheet & Tube Co., Charles M. Schwab, making his first public appearance outside New York since his election to the presidency of the American Iron and Steel Institute, Alexander Dow, president Detroit Edison Co., Detroit, and president-elect of the American Society of Mechanical Engineers, and William Abbott, former head of that organization, concluded a full day for the 700 who registered for the meeting.

Besides Mr. Campbell and Mr. Schwab, other men prominent in the steel industry present at the dinner or during the meeting included H. G. Dalton, who Mr. Campbell said is a director of so many steel companies that he has lost the count; Henry Coulby, long head of the Pittsburgh Steamship Co. and now active in the affairs of the Central Alloy Steel Corporation; Thomas J. Bray, president Republic Iron & Steel Co.; Julius Kahn, president Truscon Steel Co., and

William B. Schiller, former president National Tube Co.

Meeting Was a Case of Cooperation

In this "coming out" party of the new organization, the Buffalo Engineering Society, the Cleveland Engineering Society, the Engineers Society of Western Pennsylvania, the Lehigh Valley Engineers Club and the Technical Federation of Erie cooperated with the Akron, Buffalo, Birmingham, Chicago, Cleveland, Columbus, Detroit, Erie, Lehigh, Philadelphia, Pittsburgh and Toledo local sections of the American Society of Mechanical Engineers, under the auspices of which the meeting was held. Few of the places mentioned failed to have representation at the gathering.

When other organizations learn, as they will, how well this huge gathering was cared for by the Youngstown committee on arrangements, they will want to go to Youngstown for meetings. What the city may lack in hotel and auditorium facilities it makes good in the hospitality and cordiality of its citizens and the leaders of its industries. C. S. Robinson, vice-president Youngstown Sheet & Tube Co., was chairman of the committee on arrangements and was assisted by Thomas J. Bray, Julius Kahn, Frank Purnell, Andrew Carnegie, L. N. McDonald and H. L. Rownd. The executive committee of the new division comprises F. C. Biggert, Jr., president United Engineering & Foundry Co., Pittsburgh; George T. Snyder, chief engineer National Tube Co., Lorain, Ohio; W. W. Macon, managing editor THE IRON AGE, New York; and C. S. Robinson, vice-president Youngstown Sheet & Tube Co.

Super-Refractories for Furnace Use

C. M. Phelps, director of research and test, Refractory Fellowship, Mellon Institute of Industrial Research, University of Pittsburgh, who presented the first paper of the technical session, which was presided over by E. T. McCleary, vice-president Youngstown Sheet & Tube Co., told of the principal developments in recent years in connection with the efforts to bring up the standards of the various kinds of refractories for metallurgical and boiler furnaces to present-day requirements, and what might be done in raising them further.

He believes that one means of attaining the latter end would be closer cooperation between the consumers and the manufacturers. If the former will become familiar with the properties and limitations of refractories, and apply the knowledge gained from a critical study of specific conditions in service, the refractories manufacturer then will be able to develop the kind of refractory required. The author made the point also

that the cooperation of users cannot end in merely stating what had been found desirable in refractories. It must be ready to go along with the manufacturers on prices, since tests and investigations have progressed sufficiently to disclose that the kinds of refractories which would give service involve larger costs. Higher selling prices, for example, would permit the use of imported clays in the manufacture of silica brick.

Financial considerations stand in the way of progress toward betterment in almost all types of refractories. Mr. Phelps noted a passing from custom of purchases of refractories under the dictation of the head bricklayer, who might be influenced by friendship for the salesmen rather than the quality of the material. But the purchasing agent, whose principal aim is to buy as cheaply as possible, is still a factor to be reckoned with. He expressed the belief that, after study, it might be possible to formulate standard specifications.

This latter idea was questioned by Alexander Dow, president Detroit Edison Co., who cited the varying conditions of operating furnaces, in support of his position. O. H. Davison, United States Refractories Co., Pittsburgh, G. G. Coolidge, Harbison-Walker Refractories Co., Pittsburgh, and M. J. Terman, refractories division, Babcock & Wilcox Co., Pittsburgh, also discussed the paper. Mr. Coolidge does not think there is enough cooperation between consumers and makers of refractories. A point was made by Mr. Terman that if consumers' specifications are followed per se they cannot fail to lead to trouble. Mr. Davison thought better bricks were certain with the use of machine molds and the washing out of impurities in the raw materials.

Four-High Rolling Mills

Going deeper into the subject of continuous and four-high mills than anything which has been said previously, the paper of F. C. Biggert, Jr., president United Engineering & Foundry Co., was listened to with marked interest. It not only reviewed the development of these types of mills, but furnished details not previously made public. Mr. Biggert could talk with authority, since few others have contributed more to the development of these mills. This paper is published in full on another page, as is also a companion paper by Lloyd Jones, dealing with the general subject of the use of backing-up rolls.

Responsibilities of Chief Engineers

C. S. Robinson, before introducing James A. Campbell as the first speaker at the dinner in the evening, read messages of regret for their inability to be present from Joseph G. ("Uncle Joe") Butler, Jr., James A. Farrell, president United States Steel Corporation, and E. J. Buffington, president Illinois Steel Co. Each expressed good wishes for the new organization.

Mr. Campbell told the engineers that, regardless of efforts which might be made to saddle the burden upon other divisions of a company, the final responsibility for spending money in steel plant extensions and improvements falls upon the chief engineers of the

companies. It is an age of specialists and that no chief engineer can know enough about all kinds of steel plant installations to qualify as an expert in them all. The chief engineer of his company was responsible for expenditures of \$21,000,000 last year, and for an outlay of \$6,000,000 for a new boiler plant now under construction.

Better Profits Must Come From Some Source Other Than Cutting Costs

Mr. Schwab went his happiest mood one better with an amusing story to illustrate every serious point he made in his talk. As in many of his recent addresses, he said that the industry, in utilizing its resources without a fair return, is headed toward destruction. He thought economies in production costs have been about exhausted and that in the future the savings must come in the deliveries to and the servicing of customers. The differences in producing costs of the leading steel companies can, he said, be measured in cents a ton, and there is no good reason why there should not be cooperation instead of antagonism among the manufacturers.

He made a strong plea for cordial relations between manufacturers and urged that the good fellowship should not end there but go down through the ranks and bring to the workmen the same thrill from labor that employers get from providing it through the investment of money. Human engineering, that disposition which prompts the man in the ranks to put the same soul and spirit into his work that he would if he owned the company, is needed now and Mr. Schwab said that that will be the subject of his address when he quits the office of president of the American Society of Mechanical Engineers, next month.

Engineers Must Solve Economic Problems

Alexander Dow, president-elect of the society, told of some of the problems which have to be met and solved in the operation of public utilities; the necessity of thinking and planning for construction three to six years in advance of the demand; the barometric value in gaging business conditions in the variation in the consumption of electric power. He mentioned as worthy of the study of the engineers falling commodity prices, stationary labor rates and diminishing returns on capital, with an idea of finding the solution. The gain in output per man is saving the situation temporarily, but the time is coming, he warned, when foreign countries, which are learning our ways, will provide increased competition for American industries.

There is a limit to the increase in per man output, Mr. Dow pointed out, and in some way, either by some sort of governmental supervision such as is now exercised over the railroads, by shaving of sales expense, or from mutual good-will among manufacturers which will make all regard price-cutting as something unethical, there is a problem for all industry to solve, which must be faced in the next few years if capital is to have a fair return and living standards are not to be lowered.



USING stackers or portable elevators for the handling of structural steel, an unusual application of this equipment, is illustrated in the accompanying cut. The machines shown are of Lewis-Shepard Co., Boston, manufacture, and were tested in connection with the erection of an addition to the company's plant. Two hand-power machines of different heights were used for raising the I-beams into position, two men doing the work. It is stated that the beams were placed quickly and without needing the equipment ordinarily used

Charging Coke by Machinery

Skip Hoist to Fill Bins, Semi-Automatic Larry to Charge Cupola—Limestone Charged in Same Manner

BY FRED L. PRENTISS*

MANUAL labor has been eliminated to an extent that is almost startling in handling raw material to the cupolas in the new continuous gray iron foundry of the Buick Motor Co., Flint, Mich. A previous article told of the conveying and other labor saving equipment, in the use of which the Buick foundry has gone further than any other large modern production foundry in the automotive field. The present article describes the new method of mechanically making up the charges of pig iron and scrap, the method of charging the cupolas with the first fully automatic cupola charging machines ever built and the new automatic conveying and charging equipment for delivering coke and limestone to the cupolas. Expense was not spared in laying out this foundry for large production and efficient and economic operation; it is stated that the original appropriation of \$5,000,000 for plant and equipment has been exceeded about 20 per cent.

A brief description of the method of making up charges and charging the cupolas will serve as an introduction to a more complete article on the make-up and charging equipment and their operation which appears on another page. Charges are made up in what is known as a make-up room located at the side of the raw material storage yard. Along the outer side of this room is a long steel bin, one side of which extends out at an incline into the storage yard, so that the storage yard crane can dump material into the bin. Different grades of pig iron and scrap are kept apart by being dumped into separate sections of the bin.

From the bin a make-up crane hoists the raw material with a magnet, one kind of material at a time, and discharges it into a weigh hopper in the cab of the crane. From this hopper it is dumped into any one of 15 stationary storage hoppers set in line under the weigh hopper. Set on the floor beneath the storage hoppers are charging buckets. Lift platform electrical trucks carry the buckets 200 to 300 ft. and set them on turntables beneath the charging floor. The cupola charger hoists the buckets from this floor through sheet-metal-lined shafts which extend from the lower floor through the blower room and up to the charging floor. Then the charge is delivered to the cupola and the bucket is returned. The entire operation, from the time the bucket is placed on the turntable until the empty bucket is returned to the turntable, is automatic, being controlled by a push button on the lower floor.

The labor required in the various operations of making up and charging includes two men for each make-up crane, one operator for the crane and the other for trimming the weigh hopper, one electric truck operator, one man to rotate the turntables and operate the push buttons which control the charging machine and one man on the cupola floor for each cupola. The principal duty of the latter is to see that the chargers are operated properly. If a charging machine is stopped, it may be started by a push button on the charging floor.

Semi-Automatic Charging Machines

Two semi-automatic mechanical coke charging machines, which charge the limestone also, are located on the opposite side of the cupolas from the iron chargers. Each is operated by one man. The coke and limestone are delivered to the charger from an overhead bin back of the cupolas. The charge for each 4000 lb. of metal charged is 500 lb. coke and 150 lb. of limestone. Screen

doors are provided on each side of the cupola, those on the metal-charging side being operated by air and those on the coke side by counterweights.

The cupola charging machines are of the Morgan type, supplied by the Chisholm-Moore Mfg. Co., Cleveland, which controls patents on this machine. The Chisholm-Moore company supplied also the make-up cranes and coke-charging machines and cooperated with the engineering department of the Buick company in working out the methods of material handling in the make-up room.

Another outstanding feature of the handling equipment is a skip hoist and larry, the operation of which is entirely automatic, for conveying coke and limestone to the charging floor. With this equipment these materials are delivered from a dump pit, beneath the railroad track, to the top of a coke tower adjoining the cupola charging floor. From the tower they are taken to a longitudinal bin of 400 tons capacity, back of the cupolas and above them, without manual control or attention. From this bin the coke and limestone are delivered to the chargers beneath.

The skip hoist, having a capacity of 70 tons an hour, elevates the bucket to the top of the skip, where the bucket load is dumped on to a screen set on an incline over which all but the fine coke slides down into the larry. This larry is interlocked with the skip hoist. The hoisting bucket starts back when empty and at a point in its travel throws a starting switch, which sets the larry in motion. This larry runs to a predetermined point, where switches engage limit and stop switches, bringing the car to a stop. A solenoid brake opens the gates on both sides of the larry and the contents are dumped into the bin beneath. Then a time relay starts the larry back to its receiving position, the gates being automatically closed during the travel of the car.

With the interlocking arrangement the skip hoist comes to a stop before reaching the top of the tower, should the larry not be back at its receiving point, thus preventing dumping of the skip until the larry is ready to take its load. A fully automatic control panel is mounted on the larry. The skip bucket and larry have a capacity of 100 cu. ft. each. The skip bucket is so arranged that it is loaded with the same weight of material, whether it is handling coke or limestone.

Fine Coke Screened Out

In passing from the skip to the larry, the coke is screened, because only the larger coke is used in the cupolas. Fine coke, passing through a 2-in. mesh screen, drops to a bin 18 ft. in diameter near the bottom of the tower. It is used in other parts of the plant, for the coke ovens and other purposes. This bin has two compartments, one for coke and one for coke breeze.

The longitudinal bin back of the cupolas, into which the material is delivered, is divided into two sections for each cupola, one for coke and one for limestone. An operator controls delivery into any bin desired. The skip hoist and larry for handling coke and limestone were supplied by the C. O. Bartlett & Snow Co., Cleveland.

Definite figures are not available as to the amount of labor saved by the automatic and semi-automatic equipment used in charging the cupolas. However, the saving in labor has been great and the hard, manual work required in making up charges has been almost eliminated.

Unusually large storage space is provided for raw

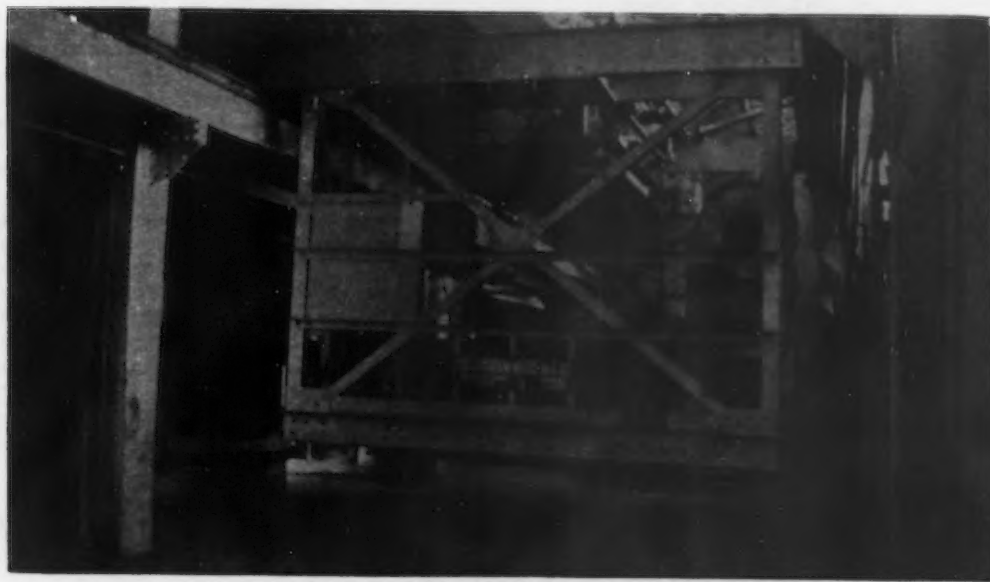
*THE IRON AGE, Cleveland.

material. Pig iron and scrap are brought on railroad cars into the stockyard, which is served by two 10-ton yard cranes with 80-ft. span, their runways being 35 ft. above the ground level. Pig iron is stored at one end and steel scrap at the other end. Additional storage space is provided outside the crane runway. One railroad siding extends along the side of the storage yard, so that pig iron and scrap can be unloaded directly from cars into the bin at the side of the make-up room.

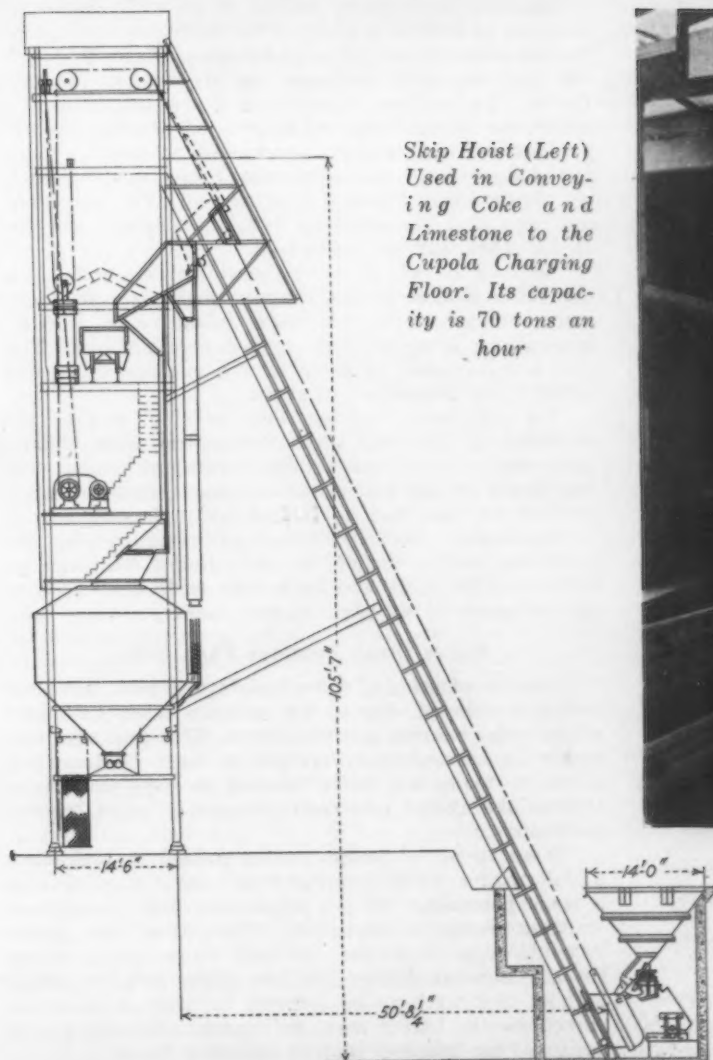
Cylinder block and head and piston castings are made of alloy cast iron, more commonly designated as semi-steel. The cupola charge of 4000 lb. is made up of 200 lb. of 14 per cent silicon pig iron, 600 lb. malle-

able iron, 600 lb. foundry iron, 200 lb. Mayari iron, 1750 lb. cast iron scrap and 650 lb. steel scrap, composed of flashings and old rails. A sample analysis of the castings is 2.40 to 2.45 per cent silicon, 0.134 per cent sulphur, 0.22 per cent phosphorus, 0.54 per cent manganese, 0.55 per cent combined carbon and 3.20 per cent total carbon.

A blower is provided for each cupola. These are the Green type, rotary, positive-pressure blowers made by the Wilbraham-Green Blower Co., Pottstown, Pa. The cupola blast is recorded by Bacharach flowmeters which register and record on a chart the flow through a 24-in. blast pipe. There is one flowmeter, having a capacity of 11,000 cu. ft. an hour, for each two cupolas.



Coke-Charging Machine (Left) Inserting Its Charge into Cupola. The measured amount is received from the coke and limestone larry shown below



For Each 4000 Lb. of Metal a Measured 500 Lb. of Coke and 150 Lb. of Limestone Are Dropped into This Larry Car, Going Thence into the Charging Machine Bin

Backed-Up Rolls of Several Types

Development of Four-Roll and Cluster Designs Has Spelled Progress—Preference for Cluster Type

BY LLOYD JONES*

APPPLICATION of backed-up rolls in mills is not new, and has been practised throughout the metal rolling industry continuously in various forms and shapes for over 60 years. There are generally five types of backed-up mills, as follows:

(1) Three-roll type, of which the Lauth plate mill is the leading example, and is in general use throughout America. In this mill the two large rolls alternately become supporting rolls to the middle roll, as the plate or sheet is run between the middle and the top roll, or between the middle and the bottom roll. Another common use for the three-roll backed-up mill has been in the hot and cold strip industry, where its use has been common for over 20 years.

(2) Four-roll backed-up mill, where each working roll has one supporting roll.

(3) Six-roll mill, commonly called the cluster mill, where each working roll has two supporting rolls.

(4) Seven-roll mill, or what might be termed the three-high cluster mill, wherein there are three working rolls, the top and bottom rolls being supported by two backing-up rolls each.

(5) There is another type of four-roll backed-up mill, of which there have been very few built. This is a modification of the three-roll mill. In this case, on account of the small diameter of the working roll, it was supported on the bottom by two backing-up rolls, the metal passing between the small roll and the large top roll. In this particular type of mill, rolls as small as 2 in. in diameter were successfully used in reducing metal.

Of these various types, the three-high is in most general use, with the four-roll and the cluster types following in that order.

For rolling sheets and strips, the four-roll type and the cluster type are better adapted than the three-roll type, and will eventually supersede it altogether.

Of the two outstanding types of back-up mills, the four-roll and cluster types, the relative merits may be presented as follows:

FOUR-ROLL TYPE

- (1) Shorter distance from the edge of the housing to the center of the mill.
- (2) Smaller number of rolls.

CLUSTER TYPE

- (1) No bearings for holding the work rolls in alignment are necessary.
- (2) The working roll cannot wear out of alignment, hence the cluster mill operator does not experience the difficulty which the four-roll operator experiences, due to the terrific end thrust of the working rolls when they become slightly crossed.
- (3) The working rolls can be more quickly changed, as there are no bearings to handle.
- (4) The working rolls automatically align themselves when placed in the mill, by coming in contact with the two supporting rolls, eliminating the human element in lining up the mill.
- (5) The contact pressure between the working rolls and the supporting rolls is approximately 30 per cent less per inch of face on the cluster mill, as compared to the four-roll mill.
- (6) The working roll is supported in both directions of force, and hence smaller diameter rolls can be used to accomplish the same work.
- (7) With equal diameter of working roll, and with the ratio of backing-up roll to the working roll approximately 2 to 1, which is the general ratio, the cluster mill has approximately 40 per cent greater capacity.

The E. W. Bliss Co. builds both types of mills at the Salem plant and has both types in successful operation.

We have had difficulties in holding the rolls in alignment on the four-roll type. The brasses on the necks become worn, or the mill is not set in correct alignment, and the rolls quickly develop an end thrust which makes changing the roll neck brasses necessary at frequent intervals. To overcome this tendency, the last mill which we shipped to the American Sheet & Tin Plate Co. was equipped with roller bearings on the working rolls as well as on the supporting rolls. We were able to do this because the mill was to be used for cold rolling purposes, and the working rolls were made of hardened tool steel, with neck diameter small enough to install the bearings, and at the same time of sufficient strength to prevent the neck from twisting off.

It is a question whether this can be done successfully when the mill is used for hot rolling, especially with rolls of chilled iron. In this case we have to deal with a metal of low strength, and the torsional stresses would probably twist off the neck.

Instance Showing Strength

Another illustration, having to do with supporting the rolls in both directions, is the following experience: On the four-roll mill, if a cobble takes place, the working rolls are apt to break and fly out of the mill. On the cluster type of mill, there was an accident in which the metal being rolled escaped between the roll surface and the stripper, and passed around the working roll between the supporting rolls approximately six times before the mill was stopped. The only damage was that the working roll was marked and had to be taken out and redressed.

No damage was done to the supporting rolls or to the roller bearings, and the six thicknesses of metal were reduced to the thickness being rolled, the six laminations being actually welded together cold. This was a remarkable example of the enormous pressure which roller bearings will stand.

We have been applying roller bearings to all types of mills for the last three years—four-high, cluster type, and also on the ordinary two-high mills. Our experience so far with roller bearings has been excellent, as we have had no failures or replacements.

Application of roller bearings to mills, like the backed-up roll principle, is old. Roller bearings on both two-high mills and backed-up mills have been in use for probably 20 years in this country.

Better Break Bearings Than Rolls

General adoption of roller bearings to mills has been seriously delayed, due to the attitude taken by many of the roller bearing manufacturers. This consists principally in demanding a decrease in the neck diameter, so as to favor the roller bearing to such an extent that on the chilled iron rolls the neck stresses become prohibitive.

There is no advantage to be gained in operating a mill with a roller bearing which lasts forever, and a large percentage of roll breakages, with consequent shutting down of operations. Far wiser and saner it would be to favor the roll neck diameter more, and subtract somewhat from the life of the roller bearing. I think that such roller bearing failures as have occurred can be traced more to improper mounting and design of the bearings than to excessive loads.

*Manager Salem plant E. W. Bliss Co. This paper was read at the Youngstown meeting of the iron and steel section of the American Society of Mechanical Engineers, Nov. 10.

Construction of the four-roll and cluster types of mills is ideal to the application of roller bearings. This is one reason why mills of these types are rapidly coming into favor. The power saved by the use of the small-diameter rolls is not nearly so great as the power saved by the use of roller bearings. The roller bearing application, however, is spreading to two-high mills, and we have a number of them in operation. But, with the exception of one or two cases, the service has not yet been long enough to give us an indication as to their life.

Alinement and Other Adjustments

Adjustment of rolls in the backed-up mills involves no difference in principles. The only departure has been the application of electric power to the screw-downs in place of hand power. This, of course, is not new on plate mills, blooming mills, etc., but it is new to the sheet and strip industry. Adjustment of the rolls, so far as alinement is concerned, consists in building the mill so that the workman has nothing to do with alining.

In the cluster mill the working rolls aline themselves. In the four-roll mill for cold rolling we put on roller bearings and take away all adjustment features. For hot rolling, where we have difficulty applying roller bearings to the working rolls, we believe the best solution will be adoption of the cluster type of mill in place of the four-roll mill. This will tend to solve several difficulties present in the four-roll mill, which has been used generally for hot rolling; alinement of the working rolls, increasing the life of the supporting roll surface by from 30 to 50 per cent, and decreasing roller bearing troubles, by lighter operating loads, and also reducing working roll breakage.

On account of the small arc of contact with the metal being rolled, the total bending load on the backed-up mill is considerably less. This cuts down the deflection or spring in the mill, and in many cases obviates the necessity for crowning the rolls. Shaping the surface of the roll to deliver a sheet or strip within commercial tolerances has been common practice for years.

Eliminating Most of the Crown

When the first cluster mill was installed at Huntington, in the early part of 1923, we assumed that it would be necessary to crown the working rolls. We started that mill with the one roll straight and the other one crowned. The backing-up rolls were all straight cylinders. We soon found that we did not need so

much crowning, and this has been reduced gradually until the present practice uses very little crowning.

This question of shaping the rolls is becoming of less importance every day. Our practice now is to ship the mills from our shops with rolls ground perfectly straight. Whether crowning of the rolls is necessary or not seems to depend a good deal upon the product to be rolled. With the use of roller bearings, which eliminate the heat produced by neck friction, the swelling of the rolls at their ends due to increased temperature is being eliminated. This in turn has a tendency to do away with the old practice of shaping the rolls.

Historical Development of Backing-Up Rolls

About 1913 there were eight cluster mills in operation, and one four-roll mill. About 1916 the second four-high mill was installed, at Lukens Steel Co. After a gap of approximately seven years, until 1923, there has been tremendous building of backed-up mills.

During 1922 the International Nickel Co. at Huntington, W. Va., was making full-finished nickel and Monel metal sheets. To secure the desired surface, it was found necessary to grind, polish and buff the sheet. This was a slow and costly process.

Cold rolling was suggested as a solution. Experiments showed that, by reducing the thickness by cold working, we could secure a surface which would eliminate the grinding process. These experiments were conducted on the ordinary two-high mill, with rolls approximately 18 in. wide.

Comparison of Passes Necessary

To accomplish the same amount of reduction on the ordinary two-high cold rolling sheet mill, of which several were in the plant, the rolls being 26 in. in diameter, we found it would be necessary to make from 40 to 60 passes. The speaker then proposed a mill of the backed-up principle. In studying the advantages of the two types of mills, the preference fell to the cluster type, and this type was installed at Huntington.

We could accomplish in three to four passes on this mill what took 40 or more passes on the regular 26-in. mill. This mill was visited by practically every sheet and strip manufacturer in the country, and many sheet manufacturers sent sheets to Huntington to be cold rolled. This was really the starting of the modern strip method of rolling sheets, because it removed the width limitations on the old cold rolling strip practice.

Safety Work as Management Function

Ohio Meeting Discussed Also Disease Prevention—Compensation Rates and Their Meaning—Less Defective Lighting

WITH the slogan "Safety Is Better than Compensation" as its guiding principle, and with an attendance of more than 1200 delegates from industrial plants throughout the State, the first All-Ohio Safety Congress, held at the Neil House, Columbus, on Nov. 9 and 10, proved to be an unqualified success. Speakers conversant with safety work related the story of the progress being made in reducing the number of lost-time accidents. In addition, demonstrations of first aid were given and an extensive exhibit of safety equipment was staged.

In connection with the Congress sectional meetings were held, one of which was for the "Metals and Foundries" group. At this session J. M. Woltz, safety director Youngstown Sheet & Tube Co., presided. Ralph H. West, president and general manager West Steel Castings Co., Cleveland, told of the opportunities for major accidents in foundries before modern practices had been introduced. He contrasted this condition with the existing situation, whereby recent changes in manufacturing methods have eliminated many hazards. Nelson Rupp, superintendent of industrial relations White Motor Co., Cleveland, described the plan of organization for safety work carried out by his company. Among the outstanding features is the fact that the cost of accidents each month is included in the budget

of every department, so that the superintendent is held directly responsible.

More attention must be paid to safety and first aid work in small plants, said Fred G. Bennett, safety director Buckeye Steel Castings Co., Columbus, in a paper on "Safety in Our Steel Foundries." He pointed out that unlimited means are available to the owners of small plants to conduct a safety program which will bring good results. That steel foundries in Ohio have shown a substantial improvement in the past nine years was indicated by the following statistics on basic rates for compensation insurance established by the Ohio Industrial Commission:

COMPENSATION INSURANCE RATES

1912	\$1.05	1918	\$2.40
1913	1.05	1919	2.35
1914 First half	0.95	1920	2.35
Second half ...	0.90	1921	2.15
1915 First half	0.90	1922	1.80
Second half ...	0.95	1923	1.25
1916 First half	1.30	1924	1.10
Second half ...	1.80	1925	0.80
1917 First half	1.80	1926	0.80
Second half ...	2.40	1927	0.70

Mr. Bennett expressed the opinion that too much insurance theory has been involved in setting the rates for compensation, and not enough faith in the program

of accident prevention. More effort toward a reduction of accidents and less anticipation of accidents would tend to bring about a better rating plan and to stimulate accident prevention programs. He urged the division of safety and hygiene of the State of Ohio to show separate statistics for the steel foundry group.

Slides and photographs showing the safeguarding of power presses were presented by Theodore O. Meisner, superintendent of the central district safety division of the American Can Co., Chicago.

To arrange for a meeting of the "Metals and Foundries" group in 1928 the following committee was appointed: J. W. Beall, Ohio Steel Foundry Co., Lima; Homer J. Weeks, American Steel & Wire Co., Cleveland; Fred G. Bennett, Buckeye Steel Castings Co., Columbus; Nelson Rupp, White Motor Co., Cleveland; William McIntire, Pickands, Mather & Co., Cleveland; and J. W. Woltz.

Interest of Management in Safety

At the general session on Nov. 9, the subject was "Elements of Industrial Safety." In discussing the attitude of management, Russell Frame, Alpha Portland Cement Co., Easton, Pa., set down four reasons why management should show an interest in safety—(1) the duty to conserve the lives of workers, (2) the fact that insurance costs are based on actual experience plus administrative expenses, (3) the attraction of workers to plants with a reputation for safety, and (4) the possibility that, unless management voluntarily does its part, public opinion will legislate to apply compulsory measures. George Hodge, assistant manager of industrial relations, International Harvester Co., Chicago, took for his subject "Beyond Management," emphasizing that cooperation between employers and employees must be secured before the best results can be procured.

Ten years ago 25 per cent of industrial accidents were caused by improper illumination, whereas today the number has been reduced to 15 per cent, according to W. E. Conley, National Lamp Works, Cleveland. Other speakers at this session were John A. Oartel, chief of safety bureau Carnegie Steel Co., Pittsburgh, talking about "The Foreman's Part in Accident Prevention," and A. V. Wilker, works manager National Carbon Co., Cleveland, on "Organizing for Safety in Small Plants."

To Combat Tendencies to Disease

Prevention of disease can be carried out in an industrial plant by extending the activities of the safety department into that field, said Dr. C. D. Selby, past-president of the Ohio State Medical Association, Toledo, in an address on "Industrial Health and Occupational Diseases," at the afternoon session on Nov. 10. To industrial medical departments maintained by manufacturing companies he made the following suggestions:

1. Study features of all operations, processes and methods used in the plant, to ascertain whether they are harmful to health.
2. Examine employees when they are hired, when they return after three months or more absence, when they return after sickness or injury, when they do not feel well or look sick, when they fall down on production requirements, unless the reason is evidently not physical, and when they quit.
3. Foster cooperation of personnel managers and foremen in applying the information gained in plant studies and physical examinations to the most effective placement of all employees.
4. Make tours of inspection to correct harmful conditions such as monotony, concentration, isolation, speed, overtime and inadequate ventilation.
5. Instruct employees by means of lectures, personal talks, bulletins, posters, etc.
6. In times of epidemic inspect employees daily.
7. Provide facilities for prophylactic and emergency dental service.
8. Provide reconstructive measures to rehabilitate injured and handicapped workers.
9. Advise and assist employees in the solution of social and financial problems.

John P. Frey, president of the Ohio State Federation of Labor, gave labor's views on accident prevention. He stated that a joint committee from his organization and from the Ohio Manufacturers Association meets before each legislative session starts, and agrees upon the safety measures which are to be in-

troduced for passage by the State Legislature. This is a practical example of cooperation between employers and employees.

Dr. Otto P. Geier, director employees' service department Cincinnati Milling Machine Co., Cincinnati, in his paper on the employers' views of accident prevention, urged organized labor to be reasonable in its demands for further increases in the schedule of benefits from State insurance. Otherwise, the cost to Ohio's industries will be so great that they cannot compete successfully against companies in other States. Doctor Geier said that complex intelligence tests are often applied when men are hired, whereas a simpler and better test would be to determine whether a man is safe or unsafe.

Basis of Higher or Lower Compensation Rates

In his talk on "How Safety Affects Compensation Rates," E. I. Evans, actuary of the Industrial Commission of Ohio, Columbus, outlined the way in which the commission fixes a basic premium rate for compensation insurance. If an individual employer's experience is better than the average of the group in which he is placed, he is rewarded with a lower rate. On the other hand, companies showing a high accident rate are penalized with a high premium rate. Mr. Evans brought out the fact that there is no reduction in rate because of the use of safety devices, because in some cases they mean nothing and in other instances they constitute an actual detriment.

Charles R. Hook, vice-president and general manager American Rolling Mill Co., Middletown, spoke on "The Economic and Humanitarian Value of Safety." He said that in his company the management looks upon safety work as a problem of as great importance as the operation of the mills. The executive who does not sympathize with and give his sincere cooperation to the movement on behalf of safety is eliminated from consideration when promotions are made. Mr. Hook declared that men selected for works managers in recent years have been taken from the personnel department. They, of course, had had a background of technical experience.

Forty-two exhibitors had displays in connection with the Safety Congress. Among them were the United States Steel Corporation, the Youngstown Sheet & Tube Co. and the American Rolling Mill Co. The congress was held under the auspices of the Industrial Commission of Ohio and was managed by the division of safety and hygiene, of which Thomas P. Kearns is chief. The entire program was received with such enthusiasm that plans are under way for a similar congress next year.

Aldrey an Aluminum Alloy for Electrical Cables

Considerable attention is being given in the European press to a new aluminum alloy called Aldrey, marketed by Aluminum Industrie A.G., Neuhausen, Switzerland. It is an alloy of high strength and high electrical conductivity, and is said to be superior in these respects to pure aluminum cable and to aluminum cable with a steel core, and that it can compete on a better basis with copper for the manufacture of high-tension transmission wire. Its composition is reported to be 0.5 to 0.6 per cent silicon, 0.3 per cent iron, and 0.4 per cent magnesium, with the remainder aluminum. High conductivity is given by the correct combination of cold work and heat treatment. Its physical properties in comparison with other electrical transmission materials are given as follows:

	Copper	Aluminum	Aluminum with Steel Core	Aldrey
Specific gravity..	8.95	2.70	3.67	2.70
Tensile strength..	60,000	26,000	53,000	47,000
Elongation	2 to 3	2 to 3	2	5 to 7.5
Conductivity (times that of mercury)	57	35	27.6	31

A large map of the ports of Newport News and Norfolk has been issued by the State Port Authority of Virginia, Norfolk, in its campaign for larger use of that port. The map measures 39 x 32 in., and is on a scale of one mile to the inch.

Open-Hearth Discussion at Detroit

Making Bottom, Limestone Ratios, Snakes in Steel, Furnace Yield, Oxides, Molds and Regenerators Covered

AMONG the subjects discussed on Nov. 2 and 3 at the Hotel Statler, Detroit, by the semi-annual open-hearth conference of the American Institute of Mining and Metallurgical Engineers were a number which exigencies of space prevented reporting in *THE IRON AGE* of last week. The following paragraphs take up these topics, one after the other, and, with last week's report, make up the story of the largest of the six meetings which have been held. As was the case last May in Buffalo, and a year earlier in Chicago, discussion was full and to the point. It was brought out by some urging on the part of the chairman, Leo F. Reinartz, American Rolling Mill Co., Middletown, Ohio, but there was little reticence in giving data where available. Outside the hall, as well as inside, the men were "talking shop" and the hotel lobby heard many unaccustomed terms which are common to the operating steel man.

Making of Open-Hearth Bottoms

General practice was outlined by Hugh Jackson (a). Plain magnesite with 17 to 18 per cent of ground slag (enough to flux the magnesite) is used. The slag, which is to fill the voids, is from low-carbon steel heats. A high temperature is carried on the furnace while this bottom is sintered into place. Then it is chilled somewhat for 4 to 5 hr. before charging a heat. Large holes in operation are repaired with magnesite, whereas burnt dolomite is used for small holes.

Some of the superintendents use lump slag wherever it will hold, and throw some more on the banks before charging. Some reports showed that 2 or 3 per cent of the steel in the first heat or first two heats percolates into the bottom.

Some of the prepared refractories are used by a number of the plants. Syndolag is reported useful for small holes, while magnesite appeared to be favored for large holes. Magnifer was said to give good results, both in making up bottom and for holes. One speaker reported the use of 50 lb. of magnifer to the ton of steel.

American Magnesite Favored

Considerable difference of opinion developed regarding the respective qualities of Austrian magnesite and the domestic product. C. W. Veach (b) reported the use of American magnesite only. He uses the Washington brand, and said as good service is obtained as with the Austrian material and there is very little bottom trouble. This is used for all furnace purposes, with an average consumption over a year of 33.4 lb. to the ton of steel. He said that the differential between American and foreign magnesite in the Central West is about \$7 a ton.

Other speakers reported comparing furnace bottoms made with various magnesite brands and finding the American just as good as the foreign. Some, however, regarded the American product as distinctly inferior.

Chrome ore placed next to the brick lining of a furnace was reported by G. D. Tranter (c). Upon this base magnesite and 20 per cent ground cinder are placed. Each bath is fused for 4 to 6 hr. before the next is added. Magnesite is used for bad holes, with occasionally some magnifer. Burnt dolomite is used on the slag lines.

Large grained magnesite came in for considerable

attention, some plants reporting the practice of screening out the fine material before making a bottom. The subject of slaking of the bottom of an idle furnace was taken up. F. B. McKune, Steel Co. of Canada, avoids this trouble by putting in burnt lime to take the slaking effect.

Relation of Lime Charge to Size of Bath

A deep bath with a good, rich, limey slag, which does not have too much of the steel volume in contact with the slag, takes from 10 to 12 per cent of limestone, according to the grade of steel being made. This opinion was expressed by several of the men present. When the lime exceeds 10 per cent to any extent this slows the action of the furnace. A lower percentage, however, resulting in a raw slag, might tend to make the steel crack under rolling.

The opinion was expressed by Howard McClelland, Republic Iron & Steel Co., that 8 per cent of lime in the ordinary case takes care of the absolute chemical need. Anything above that slows the heat. Nevertheless, 11 to 12 per cent must be used at times for the best quality steel. Along this line Kenneth C. McCutcheon (d) remarked that an increase in the limestone increases the iron oxide content of the slag.

With heats higher in carbon it is difficult to get the lime off the bottom of the furnace, in the opinion of E. A. Smith, Andrews Steel Co. Under these conditions we may not obtain the benefit from the full quantity of lime charged.

Using only 7½ per cent lime, but with a good quality of scrap, Thomas J. Costello, Follansbee Brothers, Toronto, Ohio, reported having no trouble in making sheet bar. The iron oxide in the slag runs from 19 to 25 per cent. If more lime were used it would have to be thinned with fluorspar. The point was here made by J. H. McDonald, Algoma Steel Co., that the percentage of lime required varies with the silicon content of the iron. Ordinarily 10 per cent of lime will care for the silicon in the iron.

Sheet bar rolled from heats with low lime percentage is apt to be seamy, according to the opinion of several men. G. D. Tranter reported, however, that the difference in quality is not so pronounced with higher carbon in the steel as in soft steels. The whole question seems to come down to an economic balance between the time required in making the heat, on the one hand, and the benefit coming from the extra lime, on the other.

Use of as much as 12 per cent limestone was reported by Samuel B. Muir (e), who stated that a lower percentage would result in a wilder heat. He adds burnt lime in finishing most of his heats, and then uses 5 or 6 lb. of fluorspar to the ton of steel, to cut the slag.

Use of from 8 to 11 per cent of limestone was reported by George D. Walters, Atlantic Steel Co., in connection with steel for making plates. The variation depends upon the character of pig iron charged into the furnace. Most of this was open steel and the iron oxide in the slag ran from 12 to 22 per cent.

Low Percentage with Selected Materials

With uniform iron and clean scrap A. M. Hughes (f) reported using from 8.8 to 9 per cent of stone and having a slag volume of 400 lb. to the ton of steel. He expressed the opinion that a lower lime percentage would probably result in cracked steel.

This same opinion on cracks was expressed by C. W. Veach, who reported the use in foundry heats of 10.8 per cent of limestone. If the slag is thin in quality or

(a) Youngstown Sheet & Tube Co., Youngstown, Ohio.

(b) Bettendorf Co., Bettendorf, Iowa.

(c) American Rolling Mill Co., Middletown, Ohio.

(d) American Rolling Mill Co., Ashland, Ky.

(e) Donner Steel Co., Buffalo.

(f) Sharon Steel Hoop Co., Sharon, Pa.

scant in quantity the bath temperature will rise rapidly unless the furnace is checked. This increase in temperature should not be permitted until the metalloids have been pretty well worked out. Otherwise the steel will oxidize and bad results will ensue. Furthermore, it is difficult to eliminate phosphorus at a high temperature, and it may be that this condition is one of large responsibility in causing cracks.

In a small foundry furnace of 20-ton capacity Leo F. Reinartz reported the use of as low as 7 per cent of limestone. In the steel plant, however, it was necessary to go up to 9 per cent to avoid seams. He referred to the practice in German plants, using only 20 per cent of pig iron in the charge, resulting in only a small amount of silicon to be neutralized. In this case, while burnt lime is used, it is the equivalent of only $5\frac{1}{2}$ to 6 per cent of limestone.

Reporting upon very large heats, running up to 240 tons, Frank A. King, Weirton Steel Co., uses $7\frac{1}{2}$ per cent of limestone, against a larger percentage on smaller furnaces. The point was made that a certain thickness or volume of slag is needed on the bath to protect the metal against direct oxidation.

It is possible to control the iron oxide in the slag by the way the heat is melted down, in the opinion of George D. Walters. If the bath is badly oxidized before the iron is charged in, the oxide goes up to 30 per cent or more, whereas it can be held around 15 per cent if the heat is properly handled. The question of fuel has some bearing on this proportion of stone, as oil containing sulphur in some quantity requires more stone.

Testing and Inspection of Steel

Wide divergence of practice was shown when various operators were questioned as to their practice in testing or inspecting steel after rolling and before shipment to outside customers. Surface inspections, both hot and cold, were reported, these being for the most part wholly independent of the open-hearth or even the steel-making department. Chemical and physical tests, including deep etching, were reported by various men, some of whom go to the extent of polishing samples and examining them under the microscope. No settled policy developed from this discussion.

Eliminating Snakes in Steel

Snakes were first defined as being a V-shaped tear on the surface of steel, developing usually in the blooming mill. They were charged by some speakers to the mold practice, particularly where the ingot hangs in the mold. To offset some of this trouble, the use of a graphite wash in the ingot mold for all steels was reported advantageous. J. M. Hughes reported that the use of tar resulted in an inequality in the surface content of carbon, and caused cracks.

Teeming the ingots at too high a temperature was given as a primary cause of snakes by Howard McClelland (g). He charged excessive rolling drafts in the blooming mill, bad molds, etc., with other conditions as having had a good deal to do with it. Manipulation of the ingot in the blooming mill was held largely responsible by W. E. Buck (h). Other speakers, including James J. Bowden, thought that thin skinned ingots due to premature stripping were partly responsible, pointing out that a thicker skin will stand the punishment better.

Gas in the metal, improper percentages of lime in the charge and top pouring were mentioned by other speakers as primary causes of this trouble. Robert L. Cain (j) spoke of minimizing it by the use of light drafts in the mill, particularly for the first few passes. Measurements taken at about the fourth pass, after the scale had been knocked off and the reading could be made with some assurance, showed a temperature of about 2150 to 2200 deg., under conditions producing good steel.

In plate ingots of 0.13 to 0.18 per cent carbon these snakes were reported all up and down the ingot by Major James W. Mills (h). He attributed the difficulty to deep-seated blowholes. The remedy applied was

to re-phosphorize slightly, reaching 0.015 per cent. instead of 0.10 per cent. This proved effective. Additional help was suggested by R. K. Clifford, Continental Steel Co., from turning the ingot between passes, instead of slabbing it down all at once.

Differences in ferrostatic pressure were mentioned by Major Mills as responsible for some of the trouble. Taking an ingot 12 x 28 x 48 in., poured full, a "shadow" appears at one-third height from thin skin and blowholes, whereas an ingot of the same section, poured only 30 in. long, avoids this. The pressure in the longer ingots was said to keep the gases down. James J. Bowden localized the trouble by stating that it is apt to occur at the plane of meeting of butt cracks from cooling—that is, at about one-third the ingot height above the base.

Yield with Various Pig Iron Percentages in the Charge

With a 72-per cent pig iron charge J. O. Griggs, Wheeling Steel Corporation, reported a maximum yield of 87 per cent. Under substantially the same conditions, Howard McClelland said his plant is obtaining 85 per cent, but going up to 89 per cent when the pig iron component is down to 45 per cent. From 88 to 90 per cent is obtained from a 40 to 45 per cent charge at the Inland Steel Co., according to H. B. Hubbard. This becomes 85 or 86 per cent with 68 per cent of metal. The iron content or ore additions is accounted for.

Theoretically, a charge of 100 per cent pig iron should produce 90.2 per cent yield, and one of 100 per cent scrap 98.9 per cent, said Dr. C. H. Herty, Jr. (k). Losses in process will then have to be deducted. Practically, a yield of 88 per cent is likely to come from a charge of 50 per cent pig iron and 50 per cent scrap. Of the loss, $\frac{1}{2}$ per cent is accounted for by the slag pockets and regenerators. The flush slag contains, on the average, about 32 per cent of iron oxide. One other speaker reported 24 per cent iron oxide, with 60 per cent iron charge.

High yields were reported by J. M. Hughes for the first nine months of 1927. His average was 90.4 per cent. Of the loss, 0.39 per cent consisted of butts and 2.23 per cent of pit scrap, including 0.32 per cent of skulls. J. D. Walters reported a yield of 88 per cent of ingots, increased to 91 per cent when scrap is included.

It was asserted by W. R. Fleming (l) that the yield depends wholly on the charge, if the lime is not varied. It is not within the power of the operator to make much change in it. The use of rusty scrap sends a lot of tonnage up the stack.

Detection and Effect of Dissolved Oxides

Dissolved iron oxide can be readily detected, in the opinion of Dr. C. H. Herty, Jr., but this is not the case with manganese oxides. No large quantities are dissolved, but a considerable amount may be suspended in the pig iron. The effect on the finished steel is as yet unknown. Good iron will carry from 0.010 to 0.020 per cent silicates, which in the open-hearth furnace can be eliminated gradually, with a good slag. Samples for analysis have been taken in molds 2 in. square and 4 in. high.

By running a blast furnace hot in the bottom when making basic iron, many of the steel maker's troubles will be corrected, said George P. Hansen, blast furnace superintendent American Rolling Mill Co., Ashland, Ky. A graph shown by J. M. Hughes, covering the first 23 days of October, gave analyses of 138 furnace casts. The average of silicon was about 1.20 per cent, with only nine casts below 1 per cent. Manganese ran about 1.65 to 1.85 per cent and phosphorus about 1.35 per cent. Only five casts ran over 0.40 per cent sulphur, and none reached 0.45 per cent.

Ferrite Bands in Steel

Several speakers asserted that there is no known way of eliminating MnS or FeS bands. The cause was stated by W. R. Fleming as a segregating of the ferrite. The banding occurs in the center of large ingots and may be due to slow cooling. Some of the trouble may come from oxidizing agents in blowholes. Crystal growth interruption, arrested by inclusions from continuing in one direction, was suggested by James J. Bowden.

(g) Republic Iron & Steel Co., Youngstown, Ohio.
(h) National Enameling & Stamping Co., Granite City, Ill.
(j) Bourne-Fuller Co., Cleveland.
(k) United States Bureau of Mines, Pittsburgh.
(l) Andrews Steel Co., Newport, Ky.

Using producer gas as a fuel, the Pittsburgh Steel Co. reported a relining cost of about 60c. a ton of steel. This does not include front and backwall repairs, which are covered in the operating cost. A relining cost of 55c. a ton was reported by the Bourne-Fuller Co., whose furnaces use oil and have sloping backwalls. This price includes both front and backwall repairs. With coke oven gas and tar as fuels, the Donner Steel Co. reported 85c. a ton, including all items of repair. This plant has two furnaces with flat suspended roofs.

It was reported by the Continental Steel Co. that the relining costs are higher with oil than they formerly were with producer gas, but no figures were given. The Atlantic Steel Co., on the other hand, reported a lower cost with oil fuel, to the extent of 15 or 20 per cent. The oil is used on acid furnaces and the producer gas on basic. Another producer gas plant, that of the Sharon Steel Hoop Co., reported 75c. cost, including all repairs.

A budget of \$1.10 for all open-hearth repair work was reported by the National Enameling & Stamping Co., which uses oil as fuel. This includes repairs to buildings, cranes, engines, and all other mechanical equipment. Major Mills estimated that the furnace repairs run about 75c., and stated that there is a saving from the overall budget figure. In the plant of the American Rolling Mill Co., Middletown, the total charges for 1927 are expected to reach \$1, or a little more. These include sloping backwalls, Knox and Blair ports, and a lot of other special work. About 95 per cent of all the steel is below 0.10 per cent carbon.

Checker Brick Salvaged

Use of a brick cleaning machine was reported by the Atlantic Steel Co. After 125 to 150 heats, a certain proportion of the top brick are taken out and cleaned. After the full furnace run of about 250 heats, something like half the brick have to be replaced. Much better practice was reported by the Donner Steel Co., which runs the regenerators up to 700 or 800 heats and reclaims 30 per cent of the brick after that period. After about 125 heats have been taken out, 10 per cent of the brick at the top are cleaned. This same operation follows at fairly regular intervals, about 10 per cent of the brick being lost by the end of 250 heats.

Blowing of the air chamber every day, to clear the brick of loose dust, was reported by the Pittsburgh Steel Co. After 300 heats, the best of the brick are cleaned and about 30 per cent of the total are thus reclaimed. In the Canadian Steel Foundries, where the furnaces are run very hot, about one-quarter of the brick are reclaimed after a campaign. Two-thirds of the brick are salvaged by the Allegheny Steel Co. at the end of 200 to 235 heats. About half the brick are saved by the Youngstown Sheet & Tube Co., some of them being cleaned at intermediate parts of the run.

Some of the furnaces of the Steel Co. of Canada are run on by-product gas, with an average of about 300 heats, while furnaces run on producer gas, or on tar, make 225 to 250 heats. For four furnaces, five complete sets of checker brick are kept on hand. All brick taken out are cleaned and, if not in shape to put back into another furnace, they are used for lining ladles, furnace doors, etc. The cost of cleaning was placed at \$6 a thousand, while the brick so cleaned are credited back to the department at \$15.

The Weirton Steel Co. saves 30 to 35 per cent of the brick after 300 heats and blows out the checkers at the middle of the run. One-sixth of the brick are replaced after 300 heats by the American Rolling Mill Co., Ashland, Ky., with an intermediate cleaning of the slag pocket and blowing out of soot at about the mid-point of the run. The Lackawanna plant of the Bethlehem Steel Corporation takes out all of the air checker brick every second rebuilding.

Control of Furnace Conditions

Four furnaces using by-product gas at the plant of the Steel Co. of Canada produced 227,244 gross tons of ingots last year, on an average charge of 42½ per cent of pig iron. It is the practice to set the air, gas and draft at the regenerators and, except when some slight change is needed, to hold them at the set positions throughout a run. This gives regularity and helps the operation of the furnace. They may not be

changed for a month or more. They are run in conjunction with waste-heat boilers and fans, thus making it possible to control the draft closely. The temperature in the flues to the boiler is about 600 deg. Fahr.

As there is bad infiltration of air into the air chamber, the regenerator is to be covered with boiler plate. Mr. McKune estimates that twice as much air is pumped in, because of infiltration, as is needed. The air and gas passing through a port of 900 sq. in. area burns for about 8 ft., striking the bath and producing a wave. Beyond this, the hot gases are invisible. The port is 10 ft. long overall and is straight, without baffles. The outgoing port, which is on the venturi principle, has an area of 5000 sq. in. Repairs are reported at 47c. a ton, including the roofs, front and backwalls, checkers, etc.

A back pressure is obtained on the restricted port, which would be impossible with an open port. The velocity is obtained from the air, which acts as an inspirator and draws the gas with it. Gas comes in at each side of the air current, and perpendicular to it, being under 4 oz. pressure.

Hot-running furnaces are subject to more abrasion and wear and tear than when run cooler, according to W. P. Chandler, Jr., manager open-hearth department American Heat Economy Bureau, Pittsburgh. If properly designed and handled, however, sharp working and long life may be had from these furnaces. It is possible to control all the air entering, except that due to infiltration. What comes in at the bulkheads, etc., amounting to perhaps 10 per cent, is not subject to control. It is economy to hold the hot gases in the furnace as long as it is possible to obtain a maximum heat transfer within the chamber.

Recorders for CO₂ were reported as of very little use around an open-hearth plant, as there are too many extraneous influences affecting their readings. Kenneth C. McCutcheon regards the amount of oxygen as the only sure indication we have of the content of the outgoing gas. CO₂ depends somewhat upon the presence of C in the bath and slag. He tries to keep the oxygen in the outgoing port between 1 and 2 per cent.

Isley Furnace and Control

A method of furnace control was covered in a paper by G. A. Merkt of the Morgan Construction Co., Worcester, Mass., illustrated by a number of slides. This includes a venturi tube placed vertically at each end of the furnace, in place of the customary single furnace stack. There is a low-pressure fan at the base of each tube, and both fans are running steadily. One is exhausting products of combustion passing through the regenerators, while the other is furnishing enough air for combustion. Adjustment of the amount of air pumped in a minute may be made at each end for ease of control.

By using long tubes and flues, it is possible to get the waste-gas temperature as low as 400 deg. Fahr. These flues between the venturi tube and the checkers are recuperative on the reversal of the furnace. It is claimed that the life of the checkers under these conditions will be increased by 30 to 50 per cent, or even on occasion by 100 per cent. There are less violent temperature changes at reversal than with the ordinary construction. Further claims for this method include fuel savings, increased tonnage and life of the furnace, etc. One advantage mentioned is the use of stream line for the flow of gases, in place of the sharp angles now frequently encountered.

Mold Analysis and the Effect on Mold Life

Discussion of the problem of molds was started by J. E. Perry, president Valley Mold & Iron Corporation, and was carried on by W. H. Ramage of that company. Undue weight is given to the subject of the analysis of the metal, in the opinion of Mr. Ramage. Chemical and physical properties and microscopic examination, carried on for 8 or 10 years, have led finally to the conclusion that the prime factors affecting performance in order of importance are as follows: 1—Design; 2—process of manufacture; 3—proper use or abuse in service; 4—iron properties, chemical and physical.

Any of the chemical elements may exist in any man-

(Concluded on page 1424)

Swaging and Forming Machine for Buckle Tongues and Similar Pieces

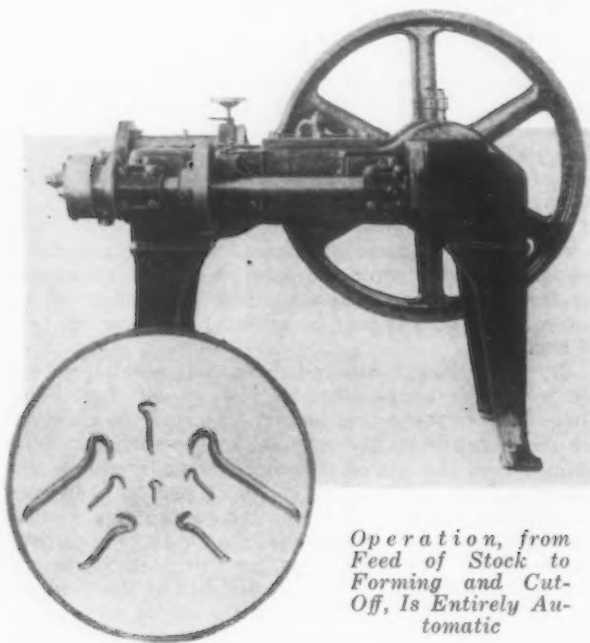
Buckle tongues and similar pieces of round wire are swaged and formed automatically on the machine here shown, which is a recent addition to the line of the E. J. Manville Machine Co., Waterbury, Conn.

The buckle tongues are usually of round soft steel or brass wire of an analysis that permits cutting, forming, swaging and bending to the shape required preparatory to tumbling, plating or japanning and closing operations. The machine illustrated is fully automatic, taking the wire from the coil, feeding the required amount, cutting off to length, swaging the form and bending with each turn of the machine.

The machine, of crank-acting type similar to the company's cold header, is equipped with a wire feed of the grooved-roll type, which is located at the left on the front of the machine. It is similar to that used on the cold header, and is adjustable for feeding various lengths of wire. The swaging ram or gate of the machine is connected by means of a pitman connection to, and receives its motion from, the eccentric portion of the crankshaft.

In the front end of the swaging ram is located the adjustable punch holder which carries the punch for cutting the wire to length, forming and swaging it in the die. The die block, located in the inside front end of the frame, is locked in position by a clamp and two bolts from the front end of the machine. The die block is provided with vertical adjustments.

A basic feature is the blank transfer mechanism. In the front end of the frame is a cam actuated plunger, within which, and moving with it, there is a secondary plunger which extends into the die block. A transfer pin in the end of the secondary plunger passes through the die. As the gate or swaging ram and punch recede, this pin transfers the blank forward against a spring-actuated plunger in the gate, which extends through and in front of the punch, until the blank is carried to



Operation, from Feed of Stock to Forming and Cut-Off, Is Entirely Automatic

a position in line with the bending or curling tool. The bending or curling tool is attached to the end of a plunger which receives its motion from a cam on right forward side of machine.

As the blank is transferred in front of the bending or curling tool, the cam-actuated plunger carrying the bending tool moves forward against the swaged end of the blank and bends or curls it to the required shape. At the conclusion of this operation the plunger and transfer pins withdraw by positive cam action, while the blank drops into a receptacle below and the operation is repeated.

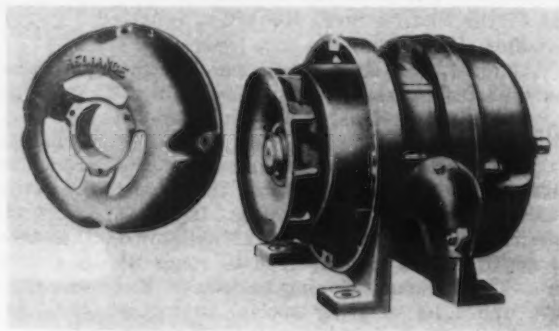
Two sizes of the machine are available. The maximum and minimum capacity, diameter of soft steel wire, of the smaller unit is 5/32 in. and 1/16 in. respectively, and of the No. 2 machine, 1/4 in. and 3/8 in. respectively.

Production on the No. 1 machine ranges from 125 to 150 blanks per min., and on the larger unit, 100 to 125 blanks per min.

Inclosed Fan-Cooled Induction Motors

Fully inclosed induction motors with ball bearings, for two- and three-phase alternating current circuits have been brought out by the Reliance Electric & Engineering Co., 1042 Ivanhoe Road, Cleveland. Machines ranging in size from 1 1/2 to 10 hp., with speeds of 900, 1200 and 1800 r.p.m., are available.

Advantages claimed include protection of motor windings against dirt and moisture, and protection of air gaps against clogging. The external appearance and the mounting and limiting dimensions are



Electrical and Operating Characteristics Are the Same as Those of Open Motors. The "external" fan blows air over the radiating bonnet and outside of the stator core

the same as a standard induction motor of the same frame size.

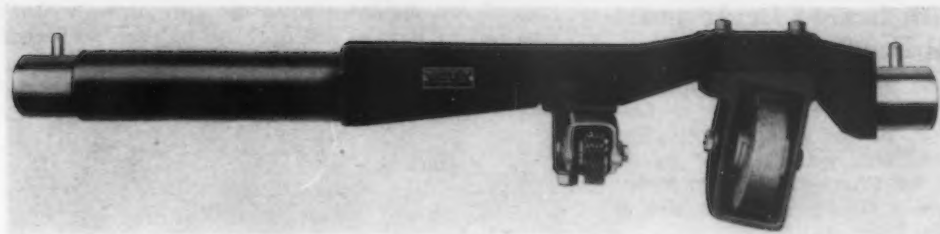
Internal fans are used to circulate the air around the coil heads, causing the internal heat to be transmitted to radiating bonnets which entirely surround the coil heads and seal the motor against the entrance of dirt. A blast of air is blown across the outside surface of these radiating bonnets to absorb the heat from the bonnets and carry it from the motor into the surrounding atmosphere. The cooling air also passes across the outside of the stator core.

The blast of air is produced by large radial fans, one at each end of the motor shaft, just outside of the bonnet. The external fans are surrounded and protected by a standard bearing bracket such as used on induction motors. All of the additional parts required for the secondary ventilation and inclosing are inside of the motor.

Aeronautic Trade Directory Shows Rapid Growth of Young Industry

Classified lists of makers and dealers in airplanes and various accessories are contained in a new aeronautic trade directory which has just been issued by the Department of Commerce, Air Information Division, office of the assistant secretary for aeronautics. The directory is divided into two sections, the first containing lists of commodities used in aviation and the second embracing its various activities. Illustrative of the growth of the industry is the fact that 90 companies are now manufacturing aircraft in the United States, while engines are being made by 13 companies. Metal hangars are being manufactured by 25 companies and skeleton towers for airways are being produced by 10 organizations. It is also interesting that 15 firms or individuals are now engaged in aeronautical consulting engineering and that the aeronautical engineering degree is conferred by 10 colleges or universities. A glance at the pamphlet offers convincing proof of the rapid growth of the industry.

October shipments of electric and industrial trucks and tractors, as reported to the Department of Commerce by the nine leading manufacturers, were 109, compared with 79 in September. Of the October shipments 11 were tractors and 81 other types for domestic use, while 17 units were exported.



The Device Includes a Metal Disk Roughing Tool and an Abrasive Finishing Tool

Wheel Truing Device for 16-In. Landis Crankshaft Pin Grinder

Economy and speed without sacrifice of finish are claimed for the wheel-truing device illustrated, which has been brought out by the Ross Mfg. Co., Cleveland, for use on 16-in. Landis hydraulic crankshaft pin grinders.

The device consists of a bar of special alloy, fitting into the pot chucks of the grinder and recessed for both a metal-disk ball-bearing roughing tool and an abrasive-wheel finishing or "master" tool. Both dressers may be bolted to the base simultaneously or each may

be used alone. When equipped with the finishing tool the device is said to produce work equal to that of a diamond, and at the same time permits faster traversing of the wheel and deeper cuts into the loaded surface without harm to the dresser. The wheel of the dresser is set at a 10-deg. "shearing angle" when bolted to the bar. The roughing tool may be used as a preliminary to finish truing or exclusively for certain work requiring a radius of not less than 3/32 in.

Another feature stressed is light weight, the unit equipped complete with a master tool weighing approximately 35 lb. A pin in either end of the bar automatically gives correct alinement to the unit.

New 3 1/2-In. Bar Capacity Turret Lathe

The Warner & Swasey Co., Cleveland, is placing on the market a new No. 3A turret lathe of 3 1/2-in. bar capacity, features of which include sturdy construction of the head and other parts, and covers for the bed ways.

The head and bed, of semi steel, are cast in one-piece, and the ribbing and weight distribution have been arranged to provide stiffness without bulk. A feature is the all-gear head, narrow construction of which has been obtained by the use of a short hollow spindle and short gear shafts. The shafts are mounted in adjustable Timken tapered roller bearings, and the gears, having ample overload capacity, run in a bath of oil. Twelve spindle speeds are obtainable, providing a range of surface speeds for large or small diameter work. Forward and reverse speeds are obtained through friction cone clutches, all other speeds through sliding gears.

Bed ways are of V-shape. Protection of the bed ways by patented way covers is a feature of this machine as in other lathes recently brought out by the Warner & Swasey company. These way covers are of heavy gage pressed steel and completely inclose the bed ways under every working condition, protecting the ways from chips, grit, dust and dirt. It is claimed by the company that way covers on turret lathes in operation over a period of two years have provided complete protection to the bed Vees and have reduced wear on this important part to a minimum. It is said that these machines move with unusual freedom because of the absence of grit, dirt, etc., and that the original scraper marks are still on the Vees.

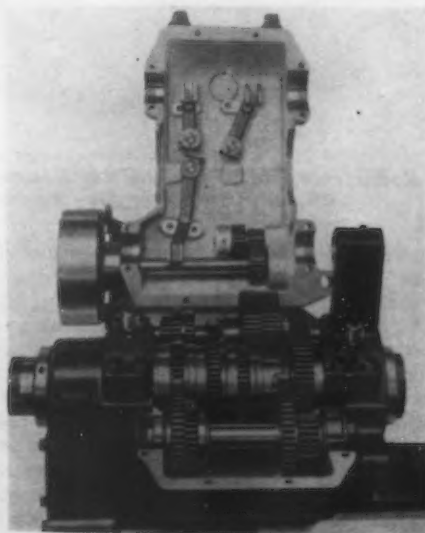
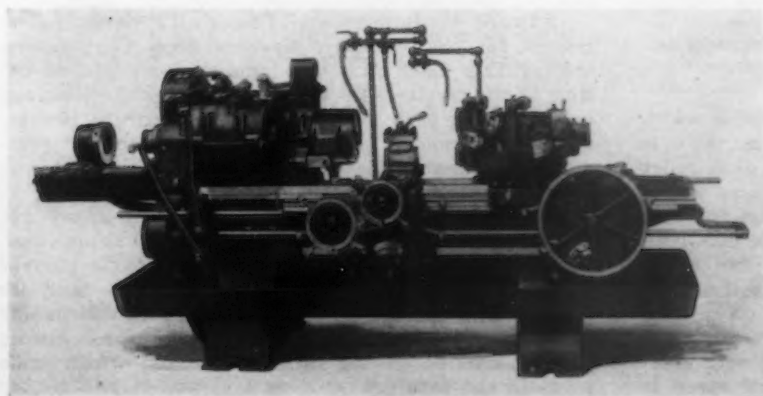
The side carriage, of the company's standard type, permits the taking of combined cuts from both turrets, and is designed to provide the rigidity necessary for supporting square turret tools under heavy feeds. Sixteen longitudinal and cross feeds are provided for the side carriage, giving two overlapping ranges for hard and soft metal.

The hexagon turret carriage is equipped with a circumference binder which clamps the turret rigidly to the saddle. The tools for the hexagon turret are bolted from the inside and centered by large projecting bosses, which arrangement is stressed as resulting in short overhang and rigid tooling. Sixteen right and left-hand longitudinal feeds are provided for the hexagon turret. The power rapid traverse moves the hexagon turret back and forth.

Gear trains for both the square and hexagon turrets are of steel, hardened, and are proportioned to permit extreme feeding pressures, especially for drilling. Each carriage may be fed independently of the other, thus permitting the use of suitable feed under all circumstances. Special attention is said to have been given to facility of operation, all operating and feed levers being within convenient reach from the operator's position.

The Siemens Schuckert Werke G.m.b.h., Berlin, Germany, recently received a contract from the Brazilian Government for the construction of the port of Aracaju in the State of Sergipe. The contract includes wharf construction, warehouses, and the furnishing of cranes, dredges and other machinery. The work will make the port accessible to ocean ships at a cost of several million dollars.

The All-Gear Head Is of Narrow Construction. Short hollow spindle and short gear shafts are used, the shafts being mounted in tapered roller bearings. Bed ways are protected by patented way covers



Disk Grinder With Geared Lever and Oil Feed

Direct connected motor drive and power-operated oscillating tables having both geared lever and oil feed for operating the table top to and from the grinding wheel are features of the disk grinder here shown, which is being marketed by Charles H. Besly & Co., 118 North Clinton Street, Chicago. The machine is designated as the No. 161 30-in. L.

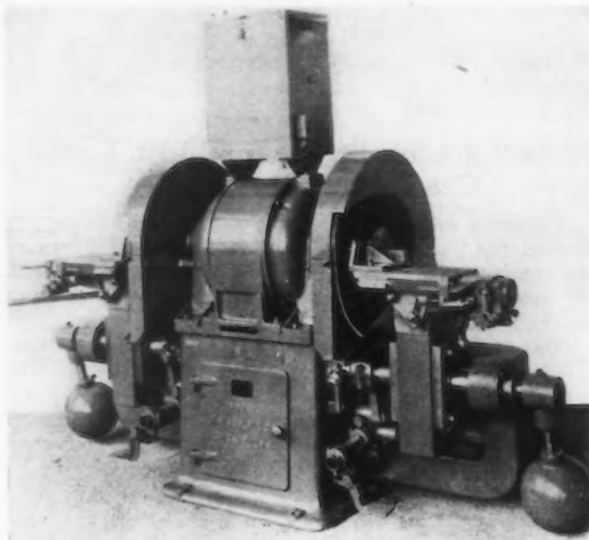
The oil feed cylinder is attached to the back of the table guide and operates directly on the table top. A three-way valve is built into and is integral with the cylinder. Oil is supplied to the cylinders through piping and flexible metal hose from a pump mounted on gear case, the pump being driven by means of spur gears in the case. Exhaust oil is returned to a tank which is part of the transmission case casting.

In operating the machine the operator places the work in position on the table, pushes the table forward, trips a latch with foot, engaging a lock bolt with connecting rod, then pushes the oil valve lever over which forces the work against the grinding wheel. Grinding of the work then commences. A micrometer stop screw on the front side of the table is set for the removal of the required amount of stock, and as soon as the table top or slide comes up to the stop, the feeding will cease. The operator then reverses the operating valve lever, whereupon the work recedes from the grinding wheel, and at the same time steps on a foot pedal to disengage the spring bolt so that the table can be drawn forward for removing the work and reloading.

Rockershafts are equipped with tapered adjustable roller bearings mounted in dustproof housings on rigid outboard supports attached to machine base. The table is attached to a heavy vertical bar which is ad-

justable up or down in a dovetail fit in rockerbox. Two locking devices are provided on each rockerbox to hold vertical bar securely in the position it is set.

The machine is equipped with a 30-hp., 865-r.p.m. induction motor, which is entirely inclosed and venti-



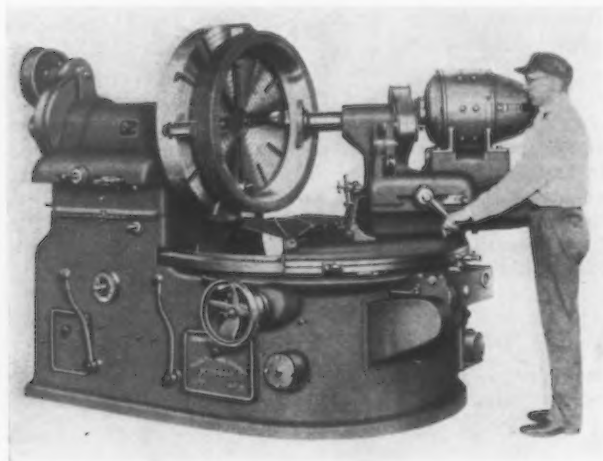
The Power-Operated Oscillating Tables Have Both Geared Lever and Oil Feed

lated through the base of the machine. An automatic starting compensator with push button control is mounted on top of motor. The power oscillating and oil gear unit is driven by $\frac{1}{2}$ -hp., 1800-r.p.m. induction motor through belt and belt tightener.

Grinder for Use on Drawing Dies

An internal radius grinder designated as the model IG is being manufactured by the Micro Machine Co., Bettendorf, Iowa, for use in grinding radii on drawing dies. The machine permits the grinding of radii from 1 in. to 10 in. in holes ranging from 10 in. to 25 in. in diameter and to a depth of 6 in.

The arrangement of the machine may be noted from the illustration. The grinding head and driving motor



Radii from 1 to 10 In. in Holes Ranging from 10 to 25 In. in Diameter May Be Ground

for the spindle are mounted on a circular table which can travel through an arc of 65 deg. The table is heavily ribbed and pivots on a pin fitted with roller bearings. It is driven by a segment gear drive and is provided with reversing dogs and quick start-and-stop controls. To facilitate setting up, the table has both hand and rapid power feed in addition to five feeds. Slide-ways are lubricated by a force feed system.

The chuck headstock spindle is mounted on tapered roller bearings $7\frac{1}{2}$ in. outside diameter by $4\frac{1}{2}$ in. inside diameter, and spaced 33 in. between centers, with take-up nut to compensate for wear. The chuck speed is

variable and may be quickly adjusted by means of a graduated dial which is located on the operative side. This dial controls the taper cone on the rear of the machine. By setting the headstock speed to suit the diameter of work a maximum stock removal is possible in large as well as in small holes. The headstock drive motor is rated at 2 hp. 1150 r.p.m.

The grinding spindle is mounted on ball bearings and runs in an oil bath in a dust-proof case. A 3-hp. 1750-r.p.m. motor is employed for driving this spindle.

Intermediate slide provides longitudinal and transverse movement for feeding the grinding wheel to the work. The table is reversible by hand, in addition to automatic reverse, from either operating position. The gear box is lubricated by means of the force feed oil system. The slideway gibs assure alinement and they are provided with a locking device to eliminate movement during grinding operations. The diamond and diamond holder bracket are provided with adjustment for dressing various sizes of wheels.

The length of the machine overall is 12 ft. and the height 6 ft. The height from the floor to the center of the grinding spindle is 4 ft. 7 in. The exhaust fan requires a 2 hp., 1750 r.p.m. motor. Floor space occupied is 12 ft. by 8 ft. The weight of the machine, with standard equipment, is approximately 12,700 lb., net.

Wickwire Spencer Plants Operating

Edward C. Bowers and Charles L. Feldman, receivers for the Wickwire Spencer Steel Corporation, inform THE IRON AGE that published reports at the time of the receivership which stated that the company had no ready cash have created an erroneous impression in the trade. The statement is made that at present the company has more ready cash than at any time within a considerable period, and is meeting all current obligations. The plants of the company are being operated to the fullest extent that business conditions and its order books will permit. "Our current cash position is good," the receivers say, "and we are going to operate all of our plants and will handle successfully and well any requirements which are at present unfilled on our order books and which come to us in the future."

NEW STANDARDS FOR NUTS

Only Slight Changes Involved in Card of Sizes Now in Effect

George S. Case, chairman, standardization committee Bolt, Nut and Rivet Manufacturers' Association, has issued the list of manufacturers' standard nuts, adopted Oct. 4. Mr. Case says that nuts to the new standards will be furnished by all manufacturers unless other nuts are specified. The new sizes are substantially the same as those which have been furnished in the past. The manufacturers' standard nut sizes are based upon table No. 5 for regular square and hexagon nuts as published by the American Engineering Standards Committee, but the $\frac{5}{16}$ -in. and $\frac{3}{4}$ -in. nuts have been made $\frac{1}{16}$ in. wider to allow the use of hot forged nuts and the $\frac{9}{16}$ -in. nut has been made $\frac{1}{64}$ in. thicker to permit the use of United States Standard $\frac{1}{2}$ -in. material on this size.

The new list of standards follows:

All dimensions given in inches.

Manufacturers' standard nuts are the same as American regular nuts except on $\frac{7}{8}$ in., $\frac{1}{2}$ in. and $\frac{3}{4}$ in. sizes. (See American Engineering Standards Committee pamphlet B18b, which can be obtained from the American Society of Mechanical Engineers, 29 West Thirty-ninth Street, New York, for complete information on American standard square and hexagonal bolts and nuts.)

FORMULAS

Width across flats of rough and semi-finished nuts shall be $1\frac{1}{2}$ D except as follows:

Diameter of Bolt	Widths Across Flats
$\frac{1}{4}$ to $\frac{3}{4}$	$1\frac{1}{2}$ D + $\frac{1}{16}$

with adjustment in the sixteenth inch sizes to eliminate thirty-second inch size wrench openings.

Tolerance for width across flats shall be minus 0.050 D.

Minimum width across rounded corners of hexagon equals 1.14 times minimum width across flats.

MANUFACTURERS STANDARD NUTS Rough and Semi-Finished Square and Hexagonal

Diameter of Bolt	Width Across Flats		Minimum Width Across Corners		Thickness		
	Maximum	Minimum	Hex.	Square	Nominal	Maximum	Minimum
$\frac{1}{4}$ 0.2500	$\frac{7}{16}$ 0.4375	0.425	0.485	0.584	$\frac{3}{4}$	0.235	0.203
$\frac{5}{16}$ 0.3125	$\frac{9}{16}$ 0.5625	0.547	0.624	0.751	$\frac{13}{16}$	0.283	0.249
$\frac{3}{8}$ 0.3750	$\frac{5}{8}$ 0.6250	0.606	0.691	0.832	$\frac{3}{4}$	0.346	0.310
$\frac{7}{16}$ 0.4375	$\frac{3}{4}$ 0.7500	0.728	0.830	1.000	$\frac{5}{8}$	0.394	0.356
$\frac{1}{2}$ 0.5000	$\frac{13}{16}$ 0.8125	0.788	0.898	1.082	$\frac{7}{8}$	0.458	0.418
$\frac{9}{16}$ 0.5625	$\frac{7}{8}$ 0.8750	0.847	0.966	1.163	$\frac{15}{16}$	0.520	0.463
$\frac{5}{8}$ 0.6250	1 1.0000	0.969	1.104	1.330	$\frac{13}{16}$	0.569	0.525
$\frac{3}{4}$ 0.7500	$\frac{15}{16}$ 1.1875	1.150	1.311	1.579	$\frac{15}{16}$	0.680	0.632
$\frac{7}{8}$ 0.8750	$\frac{15}{16}$ 1.3125	1.269	1.447	1.742	$\frac{15}{16}$	0.792	0.740
1 1.0000	1 $\frac{1}{2}$ 1.5000	1.450	1.653	1.991	$\frac{7}{8}$	0.903	0.847
$1\frac{1}{8}$ 1.1250	$1\frac{1}{2}$ 1.6875	1.631	1.859	2.239	1	1.030	0.970
$1\frac{1}{4}$ 1.2500	$1\frac{3}{4}$ 1.8750	1.813	2.067	2.489	$1\frac{1}{8}$	1.126	1.062

Minimum width across rounded corners of square equals 1.373 times minimum width across flats.

Thickness for rough and semi-finished nuts shall be $\frac{7}{8}$ D. Tolerance for thickness shall be 0.032 D—0.024 from the minimum.

The top of rough and semi-finished square and hexagonal nuts shall be flat and chamfered; angle of chamfer with surface shall be 30 deg.; diameter of top, or of both top and bottom, circle shall be 100 per cent of the nominal width across flats.

Tolerance on diameter of top flat circle shall be minus 15 per cent.

Semi-finished nuts shall be faced on bearing surface and at right angles to the axis of the thread within 3 deg.

Taper of sides of nuts shall not exceed 4 deg.

Chain Hoist Equipped with Anti-Friction Bearings

Increase in working efficiency and longer life, as compared with the previous model, are claimed for a new Cyclone chain hoist of the Chisholm-Moore Mfg. Co., Cleveland.

The new hoist, designated as the model K, incorporates the gyrating yoke principle of the previous Cyclone hoists. Changes include the use of anti-friction bearings, eight ball-bearings, four roller bearings and a Timken thrust roller bearing in the lower swivel hook. An important change is in the four eccentric roller bearings which are now built in one complete unit, eliminating the loose rollers, requiring careful fitting, of the previous Cyclone hoist.

Another improvement is the use of alloy steel for the lift wheel, which material was adopted to assure longer life and to provide cleaner and more accurate chain pockets. All parts of the new hoist are interchangeable. The entire mechanism of the hoist is inclosed in a dust-proof, oil-tight frame and under ordinary

usage the hoist needs to be packed with grease only once a year. It is claimed that in a recent test covering a period of 320 hr. continuous operation, equivalent to lifting and lowering 38,400 1-ton loads, the new hoist showed only slight wear.

The magnetic separators used in the foundry of the Buick Motor Co. at Flint, Mich., which were illustrated in THE IRON AGE of Nov. 3, were the High Duty make, built by the Magnetic Mfg. Co., Milwaukee.

Copper Institute Formed by Copper Producers

A Copper Institute has been formed to further the interests of the producers of copper. In form, it closely resembles similar trade organizations, such as those in steel, petroleum, zinc and others. Its activities are limited to those which have been approved by the Supreme Court of the United States in various cases. The constitution of the Copper Institute, its by-laws and resolutions in regard to functions have been forwarded to the attorney general of the United States and to the Federal Trade Commission, who will be kept informed of all of its activities.

The institute will not supplant the Copper and Brass Research Association nor the American Bureau of Metal Statistics, but it will supplement the activities of those organizations, and "will generally take such steps as may lawfully be taken in furthering the copper mining industry."

Practically all of the important copper producing companies have expressed an unofficial intention to join, subject to the approval of their respective boards of directors. Other copper mining companies will be given an invitation to join, and each member is entitled to one director. The officers of the Copper Institute will be:

Chairman of the executive committee: C. F. Kelley, president Anaconda Copper Mining Co.

President: F. H. Brownell, first vice-president American Smelting & Refining Co.

Vice-presidents: Stephen Birch, president Kennecott Copper Corporation, and Walter Douglas, president Phelps-Dodge Corporation.

Secretary and treasurer: R. R. Eckert.

In addition to the above officers, with the exception of Mr. Eckert, the executive committee will include R. I. Agassiz, president Calumet & Hecla Consolidated Copper Co.; James H. Anderson, secretary United Verde Copper Co.; Gordon R. Campbell, president Calumet & Arizona Mining Co.; C. W. Nichols, president Nichols Copper Co., and L. Vogelstein, chairman of the board of the American Metal Co.

Business Analysis and Forecast

BY DR. LEWIS H. HANEY

DIRECTOR, NEW YORK UNIVERSITY BUREAU OF BUSINESS RESEARCH

Statistical Data Concerning the Chief Consuming Industries Indicate That:

1. Steel ingot production has come close to the level of composite steel demand.
2. Trend in chief consuming industries appears to foreshadow a moderate further recession, with recovery early in 1928.
3. Car and locomotive orders were the lowest for years but recovery cannot be long delayed.
4. Structural steel sales have shown remarkable uniformity this year; total orders probably will be below 1926 and 1925.
5. Exports offer little encouragement, as foreign prices are falling.
6. Sales of finished steel in September, contrary to recent experience, were below those for April.
7. Automobile production is due to recover volume and to show activity in the spring.
8. General manufacturing activity, outside steel and automotive industries, is well sustained.
9. Oil production is so far above requirements that increased drilling may not occur until late in 1928. Coal mining is depressed.
10. Farm purchasing power is better, as incomes are notably higher.

THE most encouraging thing about the steel industry is the sound policy and self-restraint shown by the producers. The cold statistics reflect a remarkably effective adjustment of supply to demand, one which is very different from the condition of over-production which developed in 1923. As activity in the steel consuming industries has slackened, the production of steel has been curtailed. And the curtailment of production has been so closely proportioned to the decline in demand that curves plotted to represent the movements of the two have been running practically parallel.

Here, too, we see the favorable side of hand-to-mouth buying. The steel producers have since 1923 become more and more accustomed to producing for current requirements. As a result, their schedules are more closely adjusted to such requirements. Now they are producing no more than is needed by consumers. Not only do they have little to worry about in the shape of inventories, but they can count on the same situation existing among the buyers. This condition will make for a more moderate depression, and for more prompt recovery when general industrial conditions begin to improve.

As to the statistical facts, our information is complete only through September. In that month the index of activity in the chief iron and steel consuming in-

dustries, after a gain in August, fell back to about the July level, which was the low point of the year. This setback was due to rather sharp reductions in automobile production, railroad freight traffic and building contracts. Mining activity (including oil production) and general manufacturing activity were a little lower, also. (In each case adjustment is made for the usual seasonal changes.)

Such declines were sufficient to offset a considerable gain in the purchasing power of farmers and a fairly steady volume of exports of iron and steel. The sharpest decline occurred in the automobile industry where, partly on account of the Ford shut-down and partly because of a general reduction in automobile sales, production in September was only 82 per cent of the average for the years 1921-1925. The general recession was reflected in a sharp drop in machine tool orders, which carried them to the lowest point since February, 1925.

But, while the indicated potential demand for steel declined about 6 per cent in September, steel production (adjusted) declined over 7 per cent thus closely paralleling the demand curve. Indeed the statistical computations show that the production curve is a little under the demand curve so as partly to compensate for the excess production of April and May.

As to the future, we note that railroad traffic

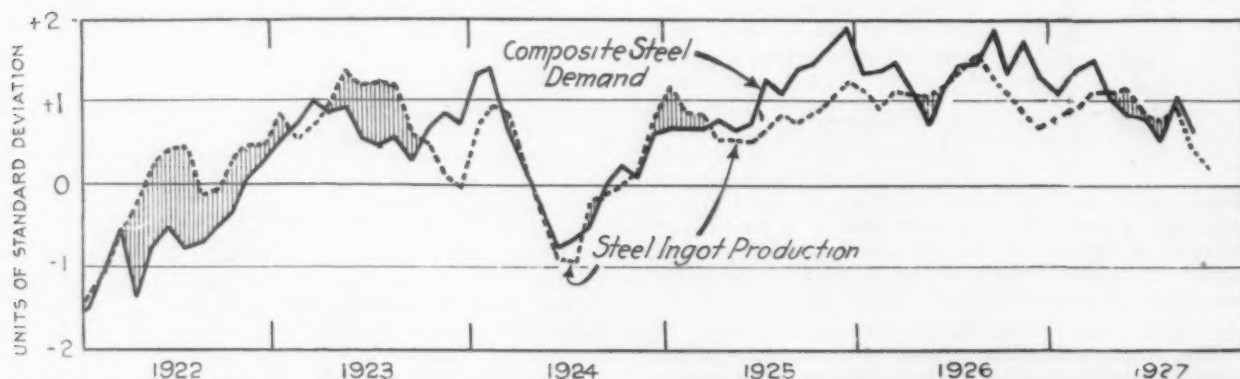


Fig. 1—Ingot Production Remains in Close Agreement with Demand. Prospects favor a moderate recovery in activity early next year

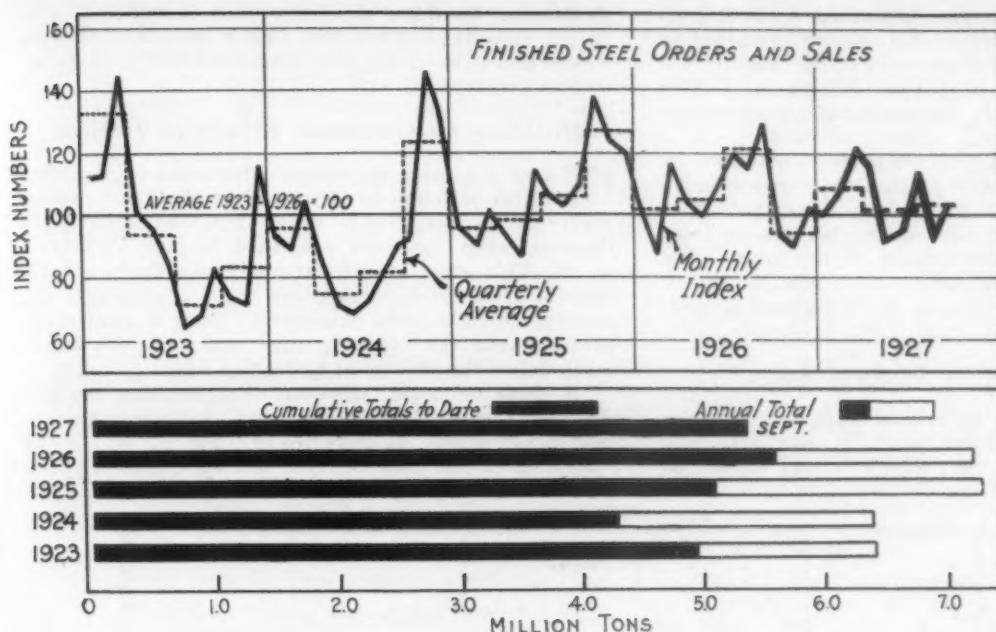


Fig. 2—Finished Steel Orders and Sales Have Shown Unusual Stability This Year. Peaks and valleys have been less pronounced than in recent previous years

showed a further decline in October, as it failed to make the usual seasonal gain in what is commonly the peak month of the year. Railroad earnings continue moderately unsatisfactory and averaged considerably below a year ago. Thus no large buying is to be expected in this quarter for two or three months yet. The volume of traffic, however, is not small and purchases have been so long postponed, and have fallen to such a low level, that a sharp increase may reasonably be expected early next year.

Building contracts gained in October, though this was evidently due to a few large enterprises; building permits, which reflect building activity in cities and towns, decreased. In view of the abundance of funds, large construction projects are likely to come forward occasionally and to give considerable, though irregular, support to the structural steel market.

Automobile production reached a new low point in October, when the output of cars and trucks appears to have been the lowest since 1922. Some recovery is probable here in the near future. The Ford plant is due to resume production on a moderate scale by December and that in itself is important for steel makers. The current uncertainty, too, will be cleared up when the new car comes on the market, and it is the general opinion that this will stimulate some buying. The automobile makers have been proceeding cautiously and are in a position to respond quickly to any improvement. It seems probable that this industry will show recovery by early spring.

Mining activity does not offer much prospect for the near future. The coal industry is depressed and

October production has declined. The oil situation is generally known. As to that situation, however, it can be said that it has probably seen the worst and that increased drilling activity will be called for before the end of 1928.

Good Conditions in General Manufacturing

General manufacturing activity (excluding iron and steel and automobile production) continues to be well sustained and the total volume is somewhat above normal. Though mixed, conditions are on the whole fair to good. Such industries as rayon, agricultural implements, electrical equipment, chemicals, food products and leather and shoes, have good prospects. The machine tool industry, however, continues disappointing. September orders were off sharply and it appears that, after some recovery in October, the November business has opened rather poorly. Probably not much improvement is to be expected here before early next year.

The farm situation continues to show improvement. In spite of increased crop estimates, farm prices have held well and the unusually early marketing of the leading crops has insured the farmers a good income. In short, the farmers have received a large number of dollars and the purchasing power of each farm dollar has recovered, so that in October it was 92 per cent of the pre-war level.

September exports of iron and steel, making due allowance for seasonal conditions, held about level with August. We would call attention, however, to the fact that the trend of commodity prices in a good many of

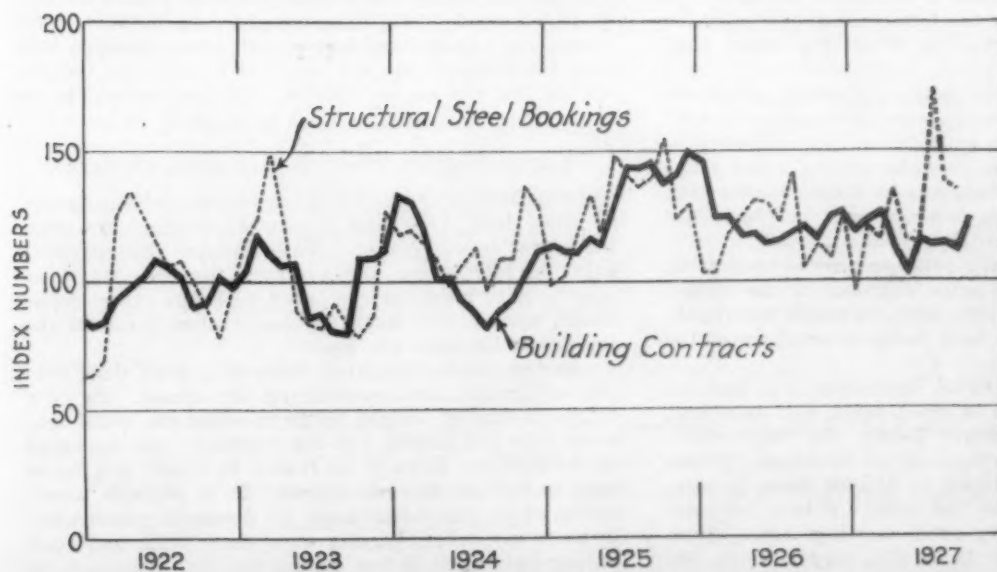


Fig. 3—Building Construction, While Continuing at a High Rate, Is Expected to Be Reduced Sharply and to Show a Low Spring Volume. Structural steel lettings will show an increase, due to several large projects under way

the leading foreign countries is toward a lower level in comparison with prices in this country, and that in some cases exchange rates are near to the point which would probably cause gold shipments from the United States. This condition is not encouraging as to our export trade.

The general conclusion which seems warranted by these various considerations is that the October index of composite demand will probably be lower than that for September, and that no considerable change is to be expected during the remainder of the year. Any change, however, will probably be in the nature of improvement, and prospects at present favor a moderate recovery early next year.

Unusual Stability in Steel Sales

OUR composite index of orders and sales for the chief items of finished steel is available only through September. In that month it was below the

September bookings at 50,300 tons comparing with 61,400 tons in August and 66,900 tons a year ago. Production is in excess of shipments, which have fallen to the lowest point since 1924.

Building Construction Likely to Decline

ONE of the least unfavorable branches of the steel industry is found in structural steel. Construction contracts, in floor space area, increased smartly in October, when the total amounted to over 76,352,000 sq. ft. This gives a seasonally adjusted index of 123, against 110.5 in September and 116.5 a year ago, the average for 1921-1925 being 100. Such a gain gives promise that the total for the year will not be so much below the 1926 total as seemed likely.

It must be noted, however, that building permits declined sharply last month, and that contemplated new construction, as reported by the F. W. Dodge Corporation, not only declined but was relatively low

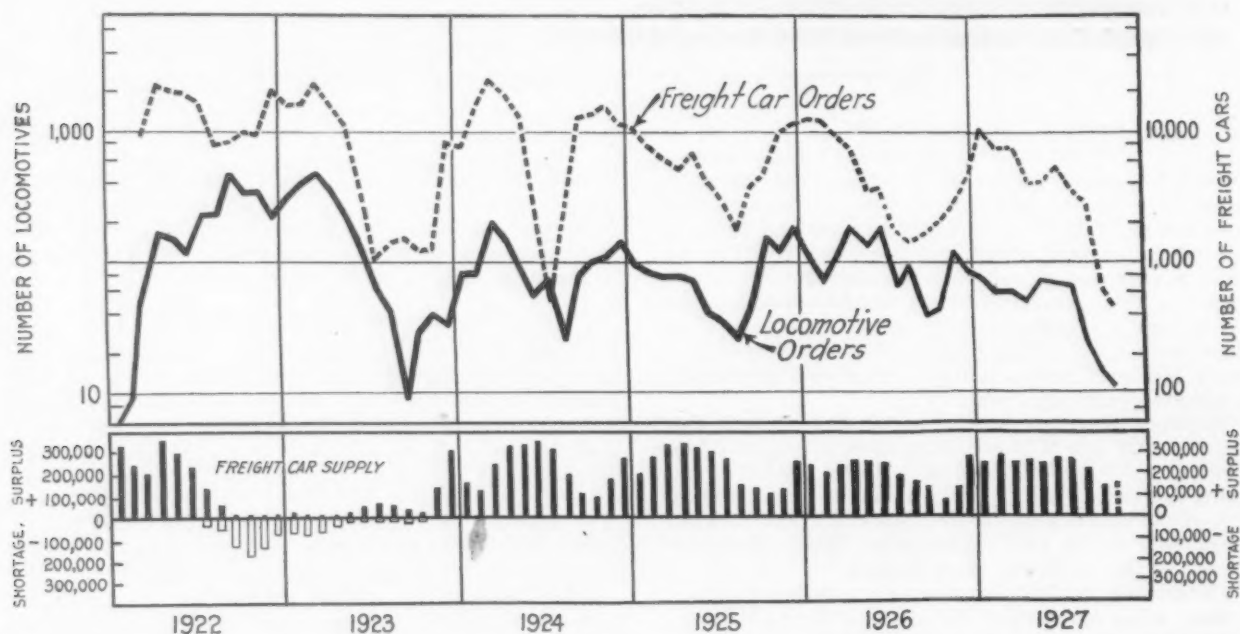


Fig. 4—Locomotive and Car Orders Made New Lows in September and Unfilled Orders Declined to the Lowest Point in Years. Both curves are plotted as a 3-month moving average

same month of 1925 or 1926. The third quarter sales this year were below those of the third quarters of 1925 and 1926. The total for the nine months was lower than the total for the first nine months of 1926, though above the same period of 1925.

Some gain was registered in September, as is usual for the season, but this gain was the smallest which has occurred in any recent September except in 1925. This is the first year since 1923 in which September orders and sales have been below those of April. It now seems probable that the total orders and sales for 1927 will be smaller than the totals for either 1926 or 1925.

One notable fact is the relative stability which the steel orders and sales have shown this year. In 1927 the peaks have been lower than in any of the three preceding years and the troughs of the sales curve have not been so low. There has been remarkably little variation in the quarterly totals. This condition is not suggestive of any further recession.

As to the last quarter, a small improvement is to be expected. The year 1926 is the only one on our record, which extends back through 1922, in which the fourth quarter orders and sales have fallen below those of the third quarter.

The increase in orders in September was due entirely to a seasonal gain in sheet sales, and even that gain was less than usual. Really the best showing was made by structural steel bookings. These amounted, in round numbers, to 241,700 tons, in comparison with 185,900 tons last year. Fabricated steel plate sales made a fairly good showing, also. Steel castings, however, appear to be at a very low ebb, the

compared with building contracts. Such a condition last year forecast the decline in building activity which occurred this spring. While recognizing, therefore, that the volume of construction has been fairly good this fall, and believing that it will continue at least as good over the rest of the year, we are not optimistic as to the spring of 1928.

Bookings of structural steel declined in September, but probably the figures will show some increase in October, as the weekly totals currently reported have averaged about 40,000 tons, against only 26,000 tons in September. Occasional large construction projects will keep the bookings up, but they are likely to be irregular, as the outlook for general building operations is only fair.

Exceptionally Poor Equipment Orders

SEPTEMBER orders for locomotives were the lowest since June, 1924, and orders for freight cars were the lowest on our record. While October showed small gains in both items, the averages for the last three months have been low compared with any other three-month period. The statistics clearly show how flat the equipment business has been.

As the chart illustrates, there is a good sized surplus of freight cars, considering the season. In view of the failure of freight traffic to show the usual seasonal gain last month, and the relatively poor earnings of the carriers, there is no reason to expect any large gain in equipment orders soon. It is perhaps worth noting that there has been an irregular downward trend in equipment buying ever since 1922, and such buying has fallen so low during the last three months

that one may well conclude that a pronounced increase cannot be far away.

Railway Age reports only 326 freight cars ordered in October and this, with the exception of September, is the smallest month's business of the year. It compares with orders for 2891 freight cars in October, 1926. Only eight locomotives are reported to have been ordered in October, which compares with 30 last

year and 199 in 1925. The unfilled orders for locomotives (180) at the end of October were practically at the same level as in September, 1921. This represents a decrease from the current September which is the more notable as the shipments also declined. As to the locomotive business, it seems fairly clear that this is about the darkest hour. The dawn of improvement should appear in a very few months.

Increase in Steel Corporation's Orders in October

A substantial increase in the unfilled orders on the books of the United States Steel corporation was recorded at the end of October. On Oct. 31 the total unfilled orders were 3,341,040 tons, or 192,927 tons in excess of the total on Sept. 30 of 3,148,113 tons. There was a decrease in September of 47,924 tons after three successive months of moderate increases. Prior to June there had been five monthly decreases.

The following table gives the unfilled tonnage by months, commencing with January, 1925:

	1927	1926	1925
Jan. 31.....	3,800,177	4,882,739	5,037,323
Feb. 28.....	3,597,119	4,616,822	5,284,771
Mar. 31.....	3,553,140	4,379,935	4,863,564
April 30.....	3,456,132	3,867,976	4,446,568
May 31.....	3,050,941	3,649,250	4,049,800
June 30.....	3,053,246	3,478,642	3,710,458
July 31.....	3,142,014	3,602,522	3,539,467
Aug. 31.....	3,196,037	3,542,335	3,512,803
Sept. 30.....	3,148,113	3,593,509	3,717,297
Oct. 31.....	3,341,040	3,683,661	4,109,183
Nov. 30.....	.....	3,807,447	4,581,780
Dec. 31.....	.....	3,960,969	5,033,364

The high record in unfilled orders was 12,183,093 tons at the close of April, 1917. The lowest was 2,674,757 tons on Dec. 31, 1910.

Lake Superior Iron Ore Shipments Decreased in October

Shipments of iron ore from the Lake Superior regions in October were 6,722,757 tons. This compares with 9,337,774 tons in October, 1926. The decrease this year was 2,615,017 tons, or 28 per cent. The season's shipments to Nov. 1 this year have been 49,110,133 tons, a decrease of 5,458,549 tons, or 10 per cent, from last year. The following table gives the October and season shipments by ports and the corresponding figures for 1926 in gross tons:

Port	October		To Nov. 1	
	1927	1926	1927	1926
Escanaba	851,766	1,152,436	5,443,204	5,957,611
Marquette ...	549,744	550,619	3,052,525	3,108,231
Ashland	784,790	1,003,955	6,022,052	6,728,480
Superior	1,951,814	2,657,134	13,923,988	15,537,395
Duluth	1,836,463	2,938,229	15,130,486	17,298,676
Two Harbors..	748,180	1,035,401	5,537,878	5,938,289
Total	6,722,757	9,337,774	49,110,133	54,568,682
Decrease ..	2,615,017	.....	5,458,549	.....

The Duluth proportion this year to Nov. 1 of 30.81 per cent of the season's shipments is less than last year, when it was 31.70 per cent. The Great Northern dock at Superior also shipped less this year than last, or 25.17 per cent, as against 25.29 per cent in 1926.

October Building Contracts Exceptionally High

New construction started in the 37 eastern States in October were higher than in any previous October. They made the fourth largest monthly total on record, according to F. W. Dodge Corporation. The total of \$562,816,000 was 8 per cent ahead of September and was 9 per cent above October, 1926. As has been the

case for several years, residential buildings were far ahead of any other group, accounting for 43 per cent of the total. The amount was \$243,562,000. Public works and utilities aggregated \$108,210,000, commercial buildings \$79,720,000, industrial projects \$50,712,000, and educational buildings \$30,170,000.

For the first ten months the construction total has reached \$5,359,298,000, an increase of \$2,792,000 over the corresponding figure for 1926.

In New York and northern New Jersey the October figure was the largest October and the second highest monthly figure on record. It stood at \$168,017,000. It was also the highest October total and the second largest monthly total in the Central West, where the amount was \$194,278,000. For most of the other districts the October total was lower than in September and lower than a year ago. The two districts mentioned, however, provided more than 60 per cent of the total for the 37 States, and the 37 States furnish normally about 91 per cent of the total United States construction.

Coal Production in 1926

Final figures of the United States Bureau of Mines show a total output in 1926 of 573,366,985 net tons of bituminous coal, valued at \$1,183,412,000. Anthracite mined amounted to 84,437,452 tons, valued at \$474,164,000. The total output of coal was thus 657,804,437 tons, valued at \$1,657,576,000, or an average of \$2.52 a ton. These quantities include about 56,000,000 tons used at the mines, sold to local trade or used by employees, and that made into coke at the mines. Deducting these items, the total production loaded at the mines for shipment was 601,604,817 net tons.

West Virginia provided the largest tonnage of bituminous coal for shipment, at 138,359,940 tons. Pennsylvania had 128,338,782 tons of bituminous and 75,318,820 tons of anthracite for shipment, making a total for that State of more than 200,000,000 tons, or slightly more than one-third of that for the entire country. Illinois and Kentucky, with more than 60,000,000 tons each, stood third and fourth, no other State having shipped as much as 25,000,000 tons.

Employees totalled 759,033, of whom 637,055 were underground. The employees worked an average of 221 days and production averaged 3.92 tons for each man per day. Active bituminous mines numbered 7177.

Navy Orders 346 Airplane Engines

WASHINGTON, Nov. 15.—The Navy Department has awarded a contract to the Pratt & Whitney Aircraft Co., Hartford, Conn., for 346 Wasp nine-cylinder 440-hp. air-cooled engines at a total cost of \$3,147,323.31. These engines will be used in the planes now under construction and the planes which will be ordered to complete the aviation building program for the year. Also, these engines will be used to replace the engines in planes now in use. The Wasp engine is used in observation planes, (O2U) Boenig fighters (F3B) and the Curtiss shipboard fighters (F7C).

Schedule of the next installments of the Business Analysis and Forecast, by Dr. Lewis H. Haney, Director New York University Bureau of Business Research, follows: Nov. 24—Position of Iron and Steel Producers; Dec. 1—General Business Outlook; Dec. 15—Activity in Steel Consuming Industries.

RATE INCREASES CANCELLED

New England Shippers Win in Protest to Interstate Commerce Commission

WASHINGTON, Nov. 15.—Proposed increased rates on iron and steel products, in less than carloads, between points in New England were held not justified in a decision of the Interstate Commerce Commission made public Saturday. The tariffs providing for the higher rates which were under suspension were ordered cancelled. They had been filed to become effective May 16, 1927, but were suspended until Dec. 16. Schedules proposing to increase carload rates on iron and steel products in the same territory also were suspended until the same date. This latter case has been consolidated with the general investigation of iron and steel rates in Official Classification territory. Schedules proposing cancellation of the intrastate rates have been voluntarily postponed by the carriers.

The increases would be brought about by the cancellation of commodity rates, except where that is impracticable due to the existence of so-called overhead rates from Trunk Line territory to New England. For instance, a rate of 27c. applicable between the Newark, N. J., rate group and Boston fixes the maximum which may be charged in the intermediate territory and prevents the application of the classification basis of fourth class, except for distances of about 80 miles and less. At present in that portion of New England, served principally by the New York, New Haven & Hartford Railroad, a commodity rate of 25c., which had its origin in rates from Trunk Line territory, has quite general application except for distances of 55 miles and less,

where fourth class obtains. It was proposed to increase the 25c. rate to 27c., which would permit the application of the fourth class basis up to about 80 miles.

The present rates of the Boston & Maine Railroad are largely on the basis of a distance commodity scale prescribed by the New Hampshire Public Service Commission in 1914, with the subsequent general percentage increases and reductions. Those rates originally were 10 per cent above the fifth class rates in force prior to the establishment of the class scale prescribed in "Proposed Increases in New England," and have never been brought into harmony with that scale, the commission said.

Approximately 25 per cent of the total less-than-carload iron and steel tonnage in New England moves under the commodity scale. The traffic considered in the report consists principally of pipe and fittings, bar iron, castings, wire and nails, distributed from several manufacturing and jobbing points to many destinations. For distances up to 50 miles practically all of the traffic now moves by truck. Iron and steel shippers and other protesting interests declared that the proposed increases if allowed to become operative would result in considerable traffic being diverted to motor trucks. They also declared that the condition of the iron and steel business in New England is serious.

Establishment of the class basis, it was stated, from and to certain points, coupled with the maintenance from and to other points of commodity rates due to the overhead rates from trunk line territory, or commodity rates which would be established to meet truck competition, would result in many disparities. The commission said that its finding should not be understood as advocating or requiring the indefinite continuance of less-than-carload commodity rates.

Rates on Scrap Brass and Copper Upheld by Commission

WASHINGTON, Nov. 15.—Rates on scrap brass and scrap copper, in straight and mixed carloads, from Kansas City, Mo.-Kan., and Omaha to St. Louis, Mo., Peoria, Ill., North Chicago and Waukegan, Ill., and Chrome, N. J., were found not unreasonable in a report of the Interstate Commerce Commission made public Saturday. The complaint against the rates, made by the Atlas Iron & Metal Co. and others at Kansas City, was ordered dismissed.

Ohio-Mississippi Barge Lines Merge, Increasing Waterways Service

The Inland Waterways Co., Louisville, Ky., and the W. C. Kelly Barge Line, Charleston, W. Va., have been consolidated into the American Barge Line. The new company will have a fleet of five tow boats and 50 steel barges and will provide a complete river transportation service on the Ohio and Mississippi rivers, making it possible for manufacturers located on or near the inland waterways who do not want to invest in tow boats and barges to take advantage of the lower rates on water-borne shipments than are charged on railroad shipments and to effect a saving on shipments where some rail haul is necessary. The new company represents the most ambitious attempt yet made to establish commercial river transportation and is the largest company of this sort on the rivers of the United States with the exception of Inland Waterways Corporation (Mississippi-Warrior River service) which is owned by the United States Government and operated under the direction of the Secretary of War.

The W. C. Kelly Barge Line, organized by W. C. Kelly, chairman Kelly Axe & Tool Co., Charleston, W. Va., and his associates, has three 720-hp. Diesel engine propelled tow boats and 16 covered and 12 open barges, while the equipment of the Inland Waterways Co. comprises two steam engine driven tow boats, eight oil tank and 16 cargo-carrying barges. The latter company has been operating on the Ohio and Mississippi rivers as a contract carrier in trade between ports and also under joint freight rates with the Louisville & Nashville, Illinois Central, and Southern railroads,

using Louisville as the transfer point from river to rail.

The new company proposes to have a sailing from Pittsburgh every 10 days and to reduce the limit of individual consignments from bargeload to carload lots. The company also is planning to extend the use of the rivers to the Youngstown district and other centers somewhat remote from the rivers by asking the railroads to establish proportional rates to Pittsburgh to replace the local rates on shipments to go to destination by water.

General offices of the company will be in Louisville, with branch offices at Pittsburgh, Cincinnati, Memphis and New Orleans. W. C. Kelly is president of the new company; Patrick Calhoun, Jr., Louisville, first vice-president; Andrew P. Calhoun, Pittsburgh, second vice-president, and Gerrard E. Kelly, Charleston, W. Va., secretary-treasurer.

Cut Ordered in Export Iron and Steel Freight Rates

The Interstate Commerce Commission has issued an order making effective from Dec. 31, next, the reduction in freight rates to North Atlantic ports on iron and steel products for export, which was the subject of a recent conference in Pittsburgh between steel company traffic officials and the representative of the Eastern Truck Line Association. From that date, the rate is 20½c. per 100 lb. or 60 per cent of the rate on domestic shipments and applies on carloads of at least 45,000 lb. The railroads in announcing a willingness to restore the pre-war export freight rate differential wanted to apply it on minimum loadings of 80,000 lb. per car, but this was opposed by some companies which could not load that heavily. There is a report that the Bethlehem Steel Co., which opposed the reduction at the Pittsburgh conference, is still opposed to it and will offer protest, which if honored by the Interstate Commerce Commission, will mean a suspension of the new rate.

The Skoda Steel Works A. G. at Pilsen, Czechoslovakia, has recently booked orders from Argentina and Uruguay for sugar machinery and equipment totaling about \$3,100,000.



Manufacture and Use of High Strength Structural Steel

A **T**IMELY discussion of "Strong Steel for Modern Long Span Bridges" was held under the auspices of the New York Chapter, American Society for Steel Treating, on Nov. 14. We seem to be in a period of notable activity in the construction of long highway bridges. That the matter was regarded of unusual importance by both civil engineers and steel makers and fabricators was evidenced by the capacity audience which lent close attention for three hours.

The Designer's and Owner's Requirements

Leon S. Moisseiff, consulting engineer for the Port of New York Authority (which is building the bridges illustrated on this page) and designer of the bridge between Philadelphia and Camden over the Delaware River, opened the subject with a discussion of the designer's and owner's requirements. He traced the development of the bridge builder's ideal away from a massive structure in masonry, to an embodiment of forces, first regarding the forces as static and the structure as rigid, but in the long bridges coming to realize that the forces are moving "live" loads, and the structure is very elastic. As the span increases, the ratio of dead load (or weight of the bridge) to the live load (or the traffic) becomes greater, until in the longest highway bridge under construction—the Hudson River bridge—it becomes as five to one.

The aim must therefore be to reduce the weight of long spans by using materials of high strength, permitting higher intensities of stress. The bridge engineer asks the steel maker to supply him with "materials dependable in action, uniform in behavior, readily and definitely inspected, and withal economical in cost." Ductility and toughness are also important, to absorb impacts and to transmit and distribute concentrated stresses. At first such special material is more costly to manufacture and fabricate than it becomes later, after sufficient experience has been gained; as the cost is reduced it becomes available for structures of lesser magnitude.

Strong steels were first introduced in bridges in this country in 1816 by White and Hazard in the form of drawn wire for bridge cables, and since then it has become a standard material for this purpose. It has progressively been improved by properly selecting the

material and refining the process, as reflected in a greater strength specified:

Bridge	Date	Specified Ultimate Strength, Lb. per Sq. In.
Brooklyn	1880	160,000
Williamsburg (N. Y.) ..	1900	200,000
Manhattan	1906	210,000
Delaware River	1923	215,000
Hudson River	1927	220,000

Use of Nickel Steel

Nickel steel is the next material of high strength to be used. In 1902 6000 tons of nickel steel eyebars 16 in. by 2 in. were used in the Queensboro cantilever bridge, New York, developing 48,000 lb. elastic limit, 85,000 lb. ultimate, 9 per cent elongation in 18 ft. and 40 per cent reduction in area,* all taken on full sized bars. Stiffening trusses in the Manhattan suspension bridge built in 1906 had nickel steel chords and web members. The longest cantilever, the Quebec bridge, used 16,300 tons of nickel steel (out of a total of 66,500 tons) in the lower chords of the cantilever arms. The 668-ft. simple trusses of the Free bridge in St. Louis are made of nickel steel throughout. Chords in the stiffening trusses of the Delaware River suspension bridge are nickel steel, and about 2300 tons will be used in a similar way in the new Hudson River bridge.

Mayari Steel

Steel of 3¼ per cent nickel is rather expensive, and some attempts were made to use chromium-nickel Mayari steel. It was used in the Harahan bridge at Memphis, in full sized eyebars specified at 47,000; 80,000. Being a "natural" alloy, Mayari steel is cheap, but its physical properties are quite variable.

Silicon Steel

Silicon steel was first used in 1915 in the Metropoles bridge over the Ohio River, to the following specifications (standard test pieces) 45,000; 80 to 95,000; 17; 35. Silicon steel to the same requirements was put into the Cincinnati bridge in 1917, and since then has been commonly used. Notable tonnages were consumed in the Delaware River bridge, and the bridge over Carquinez Straits in San Francisco Bay; 32,000 tons will be used

*For convenience, physical properties will hereafter be abbreviated. The above in short notation would read 48,000; 85,000; 9 in. 18 ft.; 40.



Two of the bridges being constructed by the Port of New York Authority; the cantilever bridge (at top of page) connecting Elizabeth, N. J., with Staten Island at Howland Hook, and the huge suspension bridge across the Hudson River at Upper Manhattan

in the towers and floor of the Hudson River bridge. It costs less than a cent a pound more than carbon structural steel.

Heat Treated Eyebars

About 12 years ago heat treated carbon steel eye-bars were proposed, and are now offered by the American Bridge Co. in the two following grades (minimum requirements in full sized bars).

Grade I	75,000; 105,000; 5 in. 18 ft.
Grade II	50,000; 80,000; 8 in. 18 ft.

Grade II has been used frequently. Recent notable bridges have been the Carquinez, taking 1400 tons, and the Florianopolis bridge, (Brazil) 800 tons.* While Mr. Moisseiff admitted that tests on such eye-bars are good, still he points out that each eyebar is heat treated individually, and an individual test is not necessarily representative of the properties of those coming before or after. "The results of such tests are informative in a statistical manner and the assurance of the behavior of the untested lots used in the bridge is based on probability only." Furthermore, civil engineers doubt that the properties of heat treated steel are sufficiently permanent to warrant installation in these structures which are built for the centuries.

Other details touched on by Mr. Moisseiff are the need of a rivet of higher strength, non-scaling when hot, and easily upset to fill deep holes. He also noted the unfortunate development of cracks and even failures in important steel castings occurring months after they have been annealed and have passed rigid inspection.

Acid Steel for Suspension Cables

A vigorous brief for acid open-hearth steel for suspension cables, presented by H. C. Boynton, metallurgist of John A. Roebling's Sons Co., Trenton, N. J., may be summed up in his statement that experience of 60 years gained by his company had convinced its officials that acid steel is more suitable for highest commercial quality than basic. Wires taken from bridges built by them during that interval (including the Ohio River bridge at Cincinnati and the Brooklyn Bridge) show properties identical with newly fabricated wire. Barring some catastrophe, and lack of reasonable maintenance, such bridges will last hundreds of years.

On the basis that the best obtainable is the right thing to put into bridge cable, acid open-hearth steel made from Swedish pig iron was first imported from England; later, when American steel became equal or better in quality, it was purchased. For the last 20 years, the Roebling company has made its own steel out of the purest low phosphorus and sulphur pig iron and ore which can be bought, plus its own analyzed scrap, melted with low sulphur fuel oil, analyzed at frequent intervals, and utilizing all the known best practices. In comparison with best basic steel, (also made in Roebling company furnaces) the superiority of acid steel is due to, and evidenced by, the following facts:

1. Acid steel has fewer sonims; the total slag and oxides reported by chemical analysis is often $\frac{1}{2}$ to $\frac{1}{3}$ the amount contained in equivalent basic steel.
2. Acid steel has less included gases (probably due to the above fact).
3. Acid steel has in nearly every test a higher tensile strength and elastic limit than basic steel of the same chemical composition.
4. Acid steel has greater uniformity in physical, chemical, and microscopic properties, day in and day out. It is therefore more fool-proof and trustworthy.
5. Acid steel has a greater resistance to fatigue stresses.

Heat Treated Wire Gives Superior Properties

Properties of wire drawn from plain carbon eutectoid steel were given by A. V. de Forest, research engineer for Page Steel & Wire Co., Bridgeport, Conn. In manufacture, the rolled rod is "patented," or heat treated to sorbitic structure to give it maximum "re-

ducibility." In this condition it has an ultimate strength of 60,000 to 80,000 lb. per sq. in. Cold drawing, in a proper succession of drafts will produce wire of 0.2 in. diameter having more than 200,000 lb. per sq. in. strength, and 300,000 to 400,000 lb. per sq. in. strength in small diameter piano wires. A stress-strain test on such wire shows a very low elastic limit; the line is slightly curved almost from the origin. Microscopically the structure is typical of severe cold work. Yet such material, which would be condemned by a mechanical engineer, is more nearly uniform in properties, piece after piece, and mile after mile, than any other rolled or heat treated product, and has proved absolutely dependable for bridge work.

Bright wire as drawn to 0.192 in. diameter will consistently test 142,000 lb. per sq. in. yield point (defined as the unit load when elongation in 10 in. equals 0.70 per cent) 275,000 ultimate, and $1\frac{1}{2}$ per cent elongation in 10 in. This last figure is not representative of its ductility, as the bright wire can be coiled into a spring around its own diameter.

Such wire is customarily galvanized by hot dipping, which causes incipient recrystallization in the steel and introduces a surface effect. Properties after galvanizing are 150,000; 228,000; 4.5. Despite the apparent increase in ductility, the bend test is not so good, nor will the galvanized wire withstand so many torsional twists before fracture.

Considerable study has been given the problem of this deterioration during galvanizing. An English firm gives the wire a final draw after galvanizing, but this so fractures the zinc coat that it will not pass the "dip test" prescribed in American specifications. Electrolytic galvanizing would be a better alternative. If the bridge engineers insist on galvanized wire, rather than use some other means of rust-proofing bright wire, Mr. de Forest recommends a quenched and drawn wire. This heat treatment (which can be done with the utmost uniformity) gives a fine grained microstructure, unaffected by the galvanizing bath. Physical properties are then 190,000; 238,000; 4.5. Such wire will withstand the bend test now given to bright wire after galvanizing, and its performance in repeated torsion is better than any other variety; in general it is a superior product which can be safely loaded with considerably higher stresses than designers now impose.

Round Lots of Special Steel Needed Before Manufacture Is Economic

Problems connected with the manufacture of the silicon steel for the Delaware River bridge towers were described by H. T. Morris, metallurgist, Bethlehem Steel Co., Bethlehem, Pa. Since the cables on this bridge are fixed to the towers, the top ends are deflected considerably by varying stresses in the cable during construction and operation. Hence a strong material was specified. About 7000 tons of the 10,000 in the towers was made of basic structural silicon steel to the following analysis:

	Test Ingot	Check Drillings
Carbon (max.)	0.40	0.44
Manganese (max.)	1.00	1.10
Silicon (limits)	0.20 to 0.40	0.18 to 0.44
Phosphorus (max.)	0.04	0.05
Sulphur (max.)	0.05	0.063

The steel was made in three different plants, in furnaces of various sizes holding from 75 to 95 tons. Data on some of the items follow:

	Sheared Plates	Universal Plates	Angles
Maximum size, in. ...	$\frac{3}{4}$ x 134 x 339	$\frac{3}{4}$ x 60 x 500	8 x 8 x $\frac{3}{4}$ x 1200
Finished weight, lb. ...	10,300		
Size ingot, in.	22 x 68	28 $\frac{1}{2}$ x 40	21 x 27
Weight ingot, lb.	17,400	20,000	11,000
Pouring	Bottom	Top	Top
Comparative yield, per cent	67	80	90

The yield, as compared to standard structural material of same size rolled on the same mills, is shown in the last line above. Plate slabs and angle blooms were carefully chipped before reheating and rolling. Despite this the surplus carbon and silicon deepen the pipe, produce more surface defects, and narrow the safe working range of temperature, thus increasing the rejects and scrap. Furthermore, the number of heats which miss the chemical and physical specifications in-

*As noted in THE IRON AGE for Aug. 25, the Hudson River suspension bridge was advertised in two designs, one in which the cables and suspenders were made of linked heat treated eye-bars. Bids showed the wire cable design could be built for a small percentage less.

crease with increasing alloys, despite the most careful attention.

Mr. Morris enumerated some other economic causes which compel the plant making standard steels to charge what may seem an unwarranted differential even for round tonnages of special steels: Cost of extra alloys, longer open-hearth heats, increased fettling costs, heavier crop, longer soaking starting from lower temperature, chipping expense, reheating chipped slabs and blooms, slower rolling speeds at definitely controlled temperatures, segregation of output, duplicate storage capacity. Added to all this is the perfectly natural attitude of the purchaser's inspector that since he is buying a special steel at an advanced price, it must be absolutely 100 per cent. Rejects can seldom be used except for scrap. Slower tool speeds are also required in subsequent fabrication.

For such reasons it is impossible for the manufacturer to stock a full line of structural shapes and plates in special steel. Even when larger tonnages are ordered, the purchaser must expect an advanced price, and more deliberate delivery, which may not justify themselves in the bridge as an economic structure. Small tonnages at present injure producer and fabricator by diminishing production and per-ton profits.

A proper relationship between added price and added duty is necessary before high strength steels can be used, in the opinion of Clement E. Chase, of

Modjeski & Chase, consulting engineers, Philadelphia. He felt that the early popularity of $3\frac{1}{4}$ per cent nickel steel had waned because bridge erectors found it was costing them more than it was worth. A large tonnage could be used in the Delaware River bridge (for which Mr. Chase was principal assistant engineer) because a large amount of scrap armor plate was available to make it from, and also because the yield point formerly specified at 40,000 lb. per sq. in. was raised to 55,000, thus allowing the designers to increase the unit stresses and correspondingly reduce the tonnages required. The nickel steel cost only 11 per cent more than silicon steel, yet it was stressed 22 per cent higher (and the physical tests averaged 27 per cent higher).

It is understood that the bids on the Hudson River bridge developed a price for nickel steel 24 per cent higher than silicon steel, since the stock of cheap raw material is no longer available. On this price basis nickel steel and silicon steel will be equivalent, unless nickel steel can be stressed even higher than in the past. Since 70 per cent of the nickel steel for the Delaware River bridge had more than 60,000 lb. yield point (even though the specification called for 55,000) Mr. Chase feels that the allowable unit stress can be safely raised. But until this is done silicon steel and nickel steel must be regarded as equivalent, except in the biggest cantilever or arch bridges, where it is necessary to keep the dead loads within limits.

German Conference on Engineering Materials

Metal Field Discussed by Producers and Consumers—Electronmetal Lighter Than Duralumin

(Special Correspondence)

BERLIN, GERMANY, Oct. 27.—An exposition organized by the Association of German Steel Engineers is holding its annual meeting in Berlin. A few other associations of the German steel and non-ferrous metal industries are cooperating. The director is Dr. Adolf Schick, while the conference was opened by Dr. Curtius.

The present conference will last from Oct. 22 to Nov. 13. It will be featured by about 200 papers on materials and by exhibitions of materials, showing improvements, testing, uses, defects and their avoidance, normalizing and standardizing of raw materials, semi-finished and finished products, etc. The conference aims at bringing together the large group of producers and the still larger group of consumers, together with scientists and practical workers.

As engineering materials and their applications are too numerous and diversified to deal with completely at one conference, the scope of this year's meetings will be restricted to metallic materials. Next year a conference will be held upon non-metallic construction materials.

The exhibition is staged in the large new automobile exhibition hall. It is not in the nature of a fair, as the equipment shown is not for sale. Even the names of the makers of the machines are not exhibited, although this may be obtained upon inquiry.

Some of the Exhibits

It is shown to the public how pig iron is made, steel ingots, all sorts of finished steel and non-ferrous metal products. Treatment of rails, railroad axles, etc., together with their testing, are exhibited. Influence of corrosion is shown by many experiments, while the heat treatment of steel and the use of alloys is a feature.

One exhibit consists of what is said to be the largest copper casting in the world. It is 16 ft. long, $5\frac{1}{2}$ ft. wide and weighs $3\frac{3}{4}$ tons. Other exhibits include an 18-in. beam, 104 ft. long, rolled from one ingot. Testing of saws, bolts, rivets and chains are shown. There is an exhibition of the production of seamless tubes and of grinding and milling machinery at work.

Microscopic views show details of the structures of metals and explain defects. Machines operate in fatigue tests, giving 4,000,000 cycles in 24 hr., and tensile testing machines are at work on all sorts of metals.

One application shown is a house built entirely of

steel. Not only are structural shapes used, but the walls and the roof, together with all of the furniture and household articles and equipment, are made of steel.

Light-Weight Metals a Feature

Latest developments in the use of electronmetal are shown, electron consisting of 85 per cent magnesium and the remainder of zinc, aluminum, etc. This is exhibited in 12 different alloys. It is used for automobiles and airplanes and is coming more and more into favor where durability and light weight are needed and cost is secondary. The alloy chiefly used in Germany is said to be 40 per cent lighter than duralumin and to have a tensile strength equivalent to that of mild steel. Parts of automobiles of this material show no wear after the machines have been run 70,000 miles.

Duralumin as made in the German industry is different from that in the United States. The Germans use 88 per cent aluminum in place of 92 per cent and only 2 per cent against 8 per cent of copper. The remaining 10 per cent is zinc. Other light-weight metals have been developed, including alneon, silumin, etc. Canoes have been made of electron weighing no more than 60 lb., for a carrying capacity of three persons.

Protecting Steel from Damage

Corrosion-resisting steel alloys and stainless steel are shown in considerable profusion. Results of many experiments with acids, sea water, etc., are given. The best results as regards corrosion are said to be steel with 0.25 per cent copper. About twice this copper content shows best resistance to sea water. Increasing the copper content above these figures does not show added benefit. The most commonly used stainless steel has about 0.50 per cent carbon and 14 per cent chromium. In addition to cutlery, this steel is used for parts of machinery, tubes, pipes, etc., which must resist acids.

Two systems of making a protective surface over steel were emphasized. One is spelter galvanizing by blowing the zinc from a pistol at high temperature. The second system consists in covering the steel with a phosphoric compound.

Each morning and afternoon there is a technical session. The subject matter is grouped according to the various materials, and within each group, according to technology, economics or national economy.

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This Issue in Brief

The limit of economics in steel production costs has been about reached, says C. M. Schwab. Future savings must come in the deliveries to and servicing of customers, he believes.—Page 1371.

Cost of accidents is charged against each department. This makes the department head directly responsible, and quickens his interest in safety measures.—Page 1375.

What causes "snakes" in steel? Causes of the V-shaped tear on the surface of the steel are: teeming the ingots at too high a rate, excessive rolling drafts in the blooming mill, bad molds, gas in the metal, improper percentage of lime in the charge, top pouring, and differences in ferrostatic pressure.—Page 1378.

Declares life of open-hearth furnace checkers can be increased from 30 to 50 per cent, and even 100 per cent upon occasion. Savings can be made by the installation of a method of furnace control which reduces the violence of temperature change at reversal, open-hearth men are told.—Page 1424.

Recovery will come early in 1928, says Dr. Haney. Trend in chief consuming industries fore-shadows a moderate further recession. As stocks in hands of producers and consumers are low, recovery will be prompt when general industrial conditions begin to improve.—Page 1384.

Refractory makers can improve their product if consumers are willing to pay more. The closer cooperation urged for refractory makers and consumers should not concern only tests and investigations, but should include price as well. For in most cases a superior product could be made if buyers would pay the price, says research chief.—Page 1371.

Gray iron foundry industry will aid itself by cooperating with Department of Commerce in market research now being conducted. Each foundry is being asked to submit data showing where gains or losses are occurring, capital invested, operating rate, etc.—Page 1394.

Inroads American tin plate mills are making into export market are causing uneasiness among Welsh producers. From 13 per cent in 1913 American share of export trade has grown to 36 per cent in 1927. Wales promises to modernize its plants to maintain its supremacy.—Page 1395.

Reduction by the cold-rolling process will ultimately prove to be the economical method of producing large tonnage gages of light hot-rolled steel, perhaps including tin plate, rolling mill builder believes. He cites as advantages of the cold strip process, lower labor costs, negligible crop losses, and sharp reduction in pickle cost.—Page 1368.

Power consumption is not appreciably affected by variations in working roll diameters of four-high mills. Tests over a wide range of diameters show that power per ton of steel is almost constant.—Page 1369.

How much limestone should be used to make good steel? Open-hearth men's reports range from 7½ to 12 per cent. The percentage required varies with the silicon content of the iron, says one superintendent.—Page 1377.

Competition should give way to coordination between wide strip and sheet mills, says rolling mill builder. Let the wide strip steel makers furnish 12, 14, or 16 gage material to the sheet steel industry in the form of hot strip, permitting the sheet makers to finish the material. In this way both the strip and sheet industries will keep their plants going.—Page 1369.

When costs can no longer be cut through increased output per man, what will happen? If capital is to have a fair return and if living standards are to be maintained, the problem will have to be solved. Government supervision may be the solution, or reduced selling expense, or a growth in good-will among manufacturers which will outlaw price-cutting.—Page 1371.

Working rolls aline themselves in the cluster type of rolling mill. These advantages of the six-roll mill over the four-high mill in hot rolling are claimed by mill builder: Increase in life of the supporting roll surface by from 30 to 50 per cent, decrease in roller bearing troubles, lighter operating load, and reduction in working roll breakage.—Page 1375.

Civil engineers still view heat-treated steel dubiously as a material for bridge construction, consulting engineer declares. They doubt that the properties imparted by heat-treatment are sufficiently permanent to warrant installation in structures built for the centuries.—Page 1390.

New light-weight alloy combines durability with strength. German alloy is said to be 40 per cent lighter than duralumin and to have a tensile strength equivalent to that of mild steel. Automobile parts of this material show no sign of wear after being in use over 70,000 miles.—Page 1391.

Cupola charging is merely a matter of pushing a button in the new Buick foundry. The operating is fully automatic, releasing men from disagreeable work, reducing costs, and resulting in a uniform quality of iron.—Page 1366.

Machinery displaces men in charging coke to Buick foundry cupolas. Coke-charging machine inserts measured amount of fuel into cupola.—Page 1373.

ESTABLISHED 1855

THE IRON AGE

A. I. FINDLEY, *Editor*

W. W. MACON, *Managing Editor*

Member of the Audit Bureau of Circulations and of
Associated Business Papers, Inc.

Published every Thursday by the IRON AGE PUBLISHING CO., 239 West 39th Street, New York
C. S. BAUR, *General Advertising Manager*

F. J. Frank, *President*

George H. Griffiths, *Secretary*

Owned by the United Publishers Corporation, 239 West 39th Street, New York. A. C. Pearson, *Chairman*. F. J. Frank, *Pres.* C. A. Musselman, *Vice-Pres.* Fred C. Stevens, *Treas.* H. J. Redfield, *Secy.*

BRANCH OFFICES—Chicago: Otis Building. Pittsburgh: Park Building. Boston: 425 Park Square Building. Philadelphia: 1402 Widener Building. Cleveland: 1362 Hanna

Building. Detroit: 7338 Woodward Ave. Cincinnati: First National Bank Building. Buffalo: 835 Ellicott Square. Washington: 536 Investment Building. San Francisco: 320 Market St.

Subscription Price: United States and Possessions, Mexico, Cuba, \$6.00; Canada, \$8.50; Foreign, \$12.00 per year. Single Copy 25 cents.

Entered as second-class matter, June 18, 1879, at the Post Office at New York, N. Y., under the Act of March 3, 1879.

PRINTED IN U. S. A.

Foundries Can Help Themselves

FROM many sources comes information about unsatisfactory business conditions in the gray iron foundries. Despite a considerable body of industrial research and a widespread adoption of labor-saving machinery the margin between operating costs and gross income is entirely too small and the total volume of production must continually withstand inroads by various substitutes.

Having these facts in view, several leaders in the gray iron industry asked the Department of Commerce whether it could not aid in collecting some fundamental data on the present situation. What is the relationship between capacity and actual production? How has this relationship changed in recent months? What industries are buying the castings, and in what quantities? Where is business being lost to other products, and how much? Where are gains being made? How much capital is actually invested in gray iron foundries?

Such questions would be the first to be asked by any manager who was disquieted by the condition of his own balance sheet, and he could rightfully expect his bookkeeper or auditor to supply the data without delay. With such information before him he could more intelligently decide what to do, what branch of his business to fortify or to eliminate, where to concentrate his effort.

Unfortunately a whole industry (like that of the gray iron foundrymen) has no super-auditor to furnish it the information it needs to chart a true course. Only by mutual cooperation can such data be secured. Mr. Hoover's department in Washington has made it relatively easy for every one to help. With the aid of well-informed foundrymen it devised a questionnaire now in the hands of the industry. The foundrymen in return should grasp the opportunity to furnish the detailed information. There can be no valid objection to submitting to the Department of Commerce such vital figures as have been requested, any more than one would hesitate to give desired data to the Census Bureau. The chances are exact-

ly zero that the information submitted in confidence will be used in any way except to build up totals picturing the condition of the entire industry.

This questionnaire deserves a 100 per cent return.

Dangerous Income Statistics

UNDER the above caption one of our daily contemporaries referred to the recent report attributed to the Bureau of Internal Revenue that the income of the American people in 1926 was about 90 billion dollars. Our contemporary assumed that this was an original estimate of the Bureau of Internal Revenue, and quite correctly pointed out dangerous deductions that might ensue from the use of such a figure. In fact, the estimate was not original with the Bureau of Internal Revenue, but was a summarization, appearing in the *Internal Revenue News*, of the estimates of the National Bureau of Economic Research.

It has previously been pointed out that in recent years the estimates of the National Bureau of Economic Research have grown increasingly out of tune with the estimates of the other authorities in respect to this subject—the National Industrial Conference Board, the Federal Trade Commission, and Dr. W. R. Ingalls, whose several estimates are in close agreement. The difference is ascribable to difference of method, the group of three authorities confining itself to estimation on the basis of current production of goods and services, while the National Bureau of Economic Research adds thereto assumptions for the rental value of real estate occupied by its owners and a conjectural allowance for interest on the value of consumption goods that are owned, i. e., such things as automobiles, furniture, etc.; in general such as would appear in an inventory of chattels. The validity of such assumptions, and especially of the last, have been vigorously challenged by economists who specialize in this subject.

Whatever may be the academic arguments pro and con, exaggerated estimation is mischievous in

several respects. In the first place, and this is the most serious thing, it shows an increase in the national income since 1921 that is far greater than the production figures indicate. The increase that is so shown is so great, indeed, as to be viewed as preposterous on the face of things. The great mischief in this is that it conveys what in all probability is an erroneous idea of the progress in prosperity of the American people during recent years.

Many subordinate misleadings may ensue. One of these is a comparison of taxation with national income. If the total of taxation be 11 billions per year, that is only about one-eighth of a total income of 90 billions, which is sufficiently bad; but it is not so bad as a comparison with the national income of about 77 billions, which appears to be approximately the figure for 1926 on a straight production basis. It is easy to surmise that the Bureau of Internal Revenue was more interested in parading the higher figure than the lower.

Our Growing Tin Plate Exports

NO little uneasiness is seen in the ranks of the Welsh tin plate industry—due partly to the inroads which American exports are making in markets formerly British. In a recent address by the president of the South Wales Siemens Steel Association, the following words are found:

America is making serious inroads into what were previously Welsh markets. In April last the tin plate trade worked 94 per cent of its allotted capacity. By the first week of this month (October) that percentage had gradually diminished to 44.89 per cent. It is no good shutting our eyes to the amazing developments which are taking place in America and on the Continent in methods of manufacture [continuous sheet process and others].

An analysis of the American and the British export trade in tin plates throws some light on these statements. Such shipments have been as follows, stated in monthly averages:

American and British Tin Plate Exports—Monthly Averages, Gross Tons

	American	British	Total
1913	6,100	41,200	47,300
1925	13,400	42,600	56,000
1927 (9 months)....	22,470	40,200	62,670

The combined tin plate exports of the two countries have increased from 47,300 tons per month in 1913 to 62,670 tons in 1927 or about 32 per cent. In 1913 the American proportion of the total was 13 per cent. This had grown by 1925 to 24 per cent. In 1927 the American proportion was about 36 per cent to Oct. 1. Thus the increase in total exports has been entirely an American gain, British trade being less this year than in 1925. The 1926 data are omitted because of the British coal strike.

The spokesman of the South Wales tin plate industry concluded his address with the remark that "we in this country are alarmed but we are not at a standstill. There is an important movement on foot in South Wales which, if successful, will show the world that we are determined to be in the forefront of the steel makers of the world with the most modern and up-to-date plants and methods."

How significant this last statement may be is yet to be seen. British and German producers are reported to be about to install the continuous sheet

mill, and representatives of both countries have been in the United States investigating the accomplishment here under patents that will revolutionize the sheet industry, though it does not yet appear to what extent the continuous production of "rough plate" will recast the tin plate industry.

Metric Compulsion Again

THE Congressman (Britten of Illinois) who in recent years has become the leading advocate of legislation extending the use of the metric system in the United States has declared his intention of introducing a new bill in the next session of Congress. Concerning it he says:

The old law, enacted sixty years ago, was not compulsory. My bill makes it compulsory as to the business to which it applies after a period of years.

This summarizes the pro-metric program in a nutshell. There is no argument in respect to the merits or demerits of the metric system of weights and measures as compared with the English system. The metric system has been legal in the United States for sixty years. It has not met with public favor. Consequently there is the proposal to make it compulsory, which indeed is all that remains to be done. The only thing that persons engaged in commerce, industry or in their daily life need to consider is whether they are willing to accept such compulsion. It has not happened before that the great majority of the people of this country have allowed a small minority to impose its will upon them.

Steel in Freight Car Building

WHILE the railroads are absorbing much less steel in freight car purchases than they did in many years before the war, or in several years since the war, the decrease from last year to this year is rather insignificant. An American Railway Association report just issued shows that the reporting railroads had 14,437 freight cars on order Oct. 1. While the number is small it is, in fact, a trifle larger than that of one year previous.

According to these monthly reports, which are issued by the car service division, the number of cars installed by the reporting roads, representing substantially all cars except those in private ownership, totaled 54,739 in the first nine months of this year against 78,691 in the same period last year, the decrease being 24,952 cars, and that decrease does not represent a great deal of steel.

As now built, refrigerator cars generally weigh 55,000 to 58,000 lb., 140,000 lb. capacity hopper cars in the neighborhood of 55,000 lb., and other cars from 40,000 to 50,000 lb. Included in these weights are wood, cast iron, malleable iron and steel castings besides rolled steel. Converted to the common denominator of the steel ingot and allowing for scrap, the average amount of rolled steel per freight car represents in the neighborhood of 24 gross tons of ingots. The decrease of 24,952 cars from the first nine months of last year to the first nine months of this year would thus represent about 600,000 tons of ingots, which is 1.7 per cent of the ingot production in the first nine months of last year. This decrease, however, is nearly one-third of the total decrease

in steel ingot production, comparing the nine-month periods, the decrease having been about 1,940,000 tons.

Of late the railroads have been retiring more cars than they have installed, but on account of the new cars being larger the total carrying capacity increases. From Jan. 1, 1926, to Oct. 1, 1927, the number of cars decreased from 2,346,805 to 2,326,324, but the total carrying capacity increased from 210,137,159,000 lb. to 211,935,628,000 lb., the average capacity per car increasing from 44.80 net tons to 45.51 net tons.

The following table, compiled from monthly reports, shows the number of cars installed by the reporting roads since the beginning of last year, the figures including a relatively small number of re-built cars:

<i>Freight Cars Installed</i>		
	1926	1927
January	4,607	4,688
February	7,665	4,132
March	8,284	4,636
April	10,505	6,105
May	9,715	7,998
June	9,036	7,428
July	10,904	6,819
August	10,292	6,784
September	7,683	6,149
October	8,380	.....
November	5,297	.....
December	4,385	.....
Total	96,753	54,739

The recent course of affairs is probably more or less typical of the future, but as this year has not been showing the normal traffic gain the future may see somewhat heavier installations.

To Aid Farming

THROUGH Hon. Charles Nagel, chairman, the "business men's commission on agriculture," set up a year ago by the National Industrial Conference Board, has issued a statement of some 4000 words making a careful presentation of the agricultural problem, with advocacy of certain measures of relief.

The statement treats of the problem of "farming," which is usually spoken of as the problem of "the farmers," and this important distinction might well have been brought out specifically. Legislation of the McNary-Haugen type is flatly condemned and among the various recommendations are two of particularly clear cut character: that the United States Government should set up a Federal Farm Board, of small personnel, "to assist in the stabilization of farm prices and production," and that there should be a National Agricultural Foundation to administer a comprehensive land utilization policy.

Another recommendation is that there be a revision of the tariff along the line of encouraging exports of farm products by increasing imports of other goods. It is pointed out—repeating what has been iterated and reiterated, and again reiterated in several years' discussions of international debts—that the United States, being in the position of a creditor nation, has made the situation in this respect increasingly difficult, the full realization being deferred by continual foreign loans. Naturally when the tariff is involved there will be much controversy, and on no question is there quite so much cocksureness, especially when the proposal advocated is that of displacing a certain percentage of home produc-

tion by goods manufactured in other countries. Even if we grant all that the business men's commission seems to have in mind in its cloudy reference to "protective policies which tend to place artificial obstacles in the way of natural and normal extension of markets for American farm products and which tend to increase the domestic costs of their production," what then? What shall it profit the American farmer to gain an additional fraction of the foreign market for his products if the process involves a lessened operation of the industries whose workers consume his products at home? The commission may well look further before presenting a choice between doing something with the tariff and renouncing the hope of substantial relief by way of increased agricultural exports.

The facts found by the commission, of farming not being what it should be as to its methods, are related to similar facts that have existed in manufacturing industries. The latter have had means of progress, manufacturers being in close contact, whereby improvements spread rapidly. Farming is scattered over the country. The problem is to apply to farming the efficiency by which manufacturing has succeeded. The difficulty lies in farming, probably more than in the farmers themselves.

With all their ability to help themselves, manufacturers have received much help from the Government, particularly from Secretary Hoover's Department of Commerce. Some time ago the administration had a project to "Hooverize" the Department of Agriculture by the mere transfer of Mr. Hoover to that department. Vastly more than that simple procedure was obviously necessary. The business men's conference recommendation of the setting up of a Federal Farm Board is the right idea; but we are doomed to disappointment if we do not recognize the great magnitude of the work involved. It is a work vastly greater than that of the whole Department of Commerce, for this new board would have to create among farmers a desire to cooperate which already existed in the case of business men, and it would have to set up very much wider means of communication than are needed in the work of the Department of Commerce. If the public will realize the magnitude of the work, and its own selfish interest in its success, and accordingly support the proposed body adequately, satisfactory results can be accomplished. The first requisite is for the public to recognize how big the undertaking is.

Upper Mississippi River Steel Shipments

Three barges, loaded with agricultural shipments from Deere & Co., and Deere & Mansur, Moline, Ill., were shipped last week up the Mississippi for Minneapolis. These barges joined a barge of steel bars, shipped from the Republic plant at Moline, and made a cargo of 745 tons. The International Harvester Co., which has established an East Moline shipping point, has made special arrangements for handling barge line shipments, principally to the South and South American ports and indications are that these manufacturing industries will be principal users of the river in the future.

CORRESPONDENCE

Bottle Test for Sand Control

To the Editor: I have had some correspondence with foundrymen who have asked whether my "bottle test," mentioned in your issue of Sept 22 (page 793), is the same as the dye-absorption test described in Doctor Moldenke's book, "Principles of Iron Founding." Since the two tests are quite different, I take this opportunity to explain my test in detail. It is more properly called a "vibratory method."

The vibratory method was originated in 1923 to study molding sand and to reduce the unnecessary losses which occur through the improper use of sand or the use of improper sands in the foundries under my direction. It is no longer practical to judge foundry sands solely by "feel," as there are so many elements and conditions which create defects and losses in castings.

Subsequent experience has shown that the vibratory method of testing, if carefully carried out and patiently studied, will indicate accurately these conditions and point the way to every change necessary to reduce foundry losses. It is necessary to test new sands as received, to test heap sands daily, and to test facing sands.

The vibratory test is made in an 8-oz. oil sample bottle, long and narrow. Fill the bottle with sand one-quarter full, preferably a little less. Then fill the bottle not quite full with plain cold water. Use no chemical. Shake well about two minutes, to wash grains thoroughly, and then add sufficient water to fill the bottle.

Use any form of vibrator, air or electric. An ordinary facial vibrator will serve, or any vibratory plate molding machine. Make a cushion or pad by folding a towel or cloth to about $\frac{3}{4}$ in. thick. Place the pad on the vibrator and the bottle on the pad. Do not allow the sand to settle in the bottle before vibrating.

Vibrate the sand until a sharp, well defined ring shows at the top of the silica, which is the bottom portion. Watch the ring form until satisfied that the "fines" are all down out of the bond, which remains in the top division. Slack up on the pressure of your hand on the bottle and make sure you allow all fines to come down.

Place the bottle in a rack or in some quiet place to settle overnight. Seven hours are sufficient.

While vibrating, observe the upper or clay portion. If it settles slowly and is so thin as to leave the water cloudy, the sand is weak. If it settles rapidly in heavy thick folds, it indicates a strong bond; the water then invariably settles clear.

If testing heap sand, look for a ring of core-sand (if used) on top of the silica (bottom) layer, in the form of silt or fines. If sea-coal facings are used, excess sea-coal will show on top of the water and excess "ash" will show on top of the bond portion.

Grain size should be examined in the lower or silica layer.

EUGENE W. SMITH,

604 South Humphrey Avenue,
Oak Park, Ill.

What Valuation on Sponge Iron?

To the Editor: I was very glad to read Mr. Tholand's letter in THE IRON AGE of Oct. 20, page 1107, pointing out the real value of properly made sponge iron. By "properly made" I refer to a sponge or metallic form of iron reduced at comparatively low temperatures, instead of at the high temperatures of a standard blast furnace, and containing over 96 per cent of pure iron, the remainder being chiefly partially reduced iron oxides.

Such a product, which can be commercially produced here, utilizing some of the immense and unused rich deposits of magnetite ore instead of the inferior hematites, is much superior as a melting base to the standard blast furnace pig iron now generally used. The price that is being paid for it, \$40 per ton, duty

paid, New York, indicates only a part of its superiority; but Mr. Tholand is quite right in asking that comparisons between pig iron and sponge iron should be made only on results obtained from the finished iron or steel and on a basis of a sponge iron, or as I think it would be better named, reduced metallic iron of a standard quality.

Processes which result in a product of 60 to 80 per cent metallic iron are not likely to be widely adopted when others are available which can give 96 per cent metallic product at probably less cost than the inferior product.

This subject of the low temperature or gaseous reduction of iron ore is going to be in the very near future one of the most important which the whole iron and steel industry will have to face. The technical and scientific papers presented before the twenty-fifth annual meeting of the American Electrochemical Society in Philadelphia last April and reviewed in your issue of May 7 showed clearly, for those who wanted to see, that the new low temperature processes are not only cheaper than present methods, but give a much better product. They really open up a new field in the metallurgy of iron and steel.

Reduced metallic iron, that in the process of reduction has not been subject to extreme high temperatures, to contact with fluxes and refractories at high temperatures, to coke, and, above all, to enormous volumes of nitrogen from the air blast, is a totally different product from pig iron and has properties undreamed of in connection with standard pig iron.

In remelting reduced metallic iron the benefit is immediately seen in products having considerably higher physical tests, in greater resistance to abrasion, corrosion and heat. The time taken in remelting such iron is also less than for a standard scrap and pig iron charge. At present the only thing influencing the high price paid for this new product is the quality in terms of physical tests, but the other features will be more fully realized as more is used.

Mr. Tholand is to be congratulated on having so clearly pointed out the position of this product of low temperature reduction in comparison with pig iron, and on cautioning your readers against sponge iron not properly manufactured. The real product is going to cause changes in accepted ideas, some in equipment, and many in values.

The present investment in standard blast furnace equipment is so gigantic and occupies so great a part of the total investment in iron and steel plants that no very drastic immediate change is possible, but it will come. The old blast furnace process is fundamentally wrong and the new basically right. The laws of economics will take care of the rest.

Yours very truly,

FRANK HODSON,
Consulting Metallurgist.

Philadelphia, Nov. 1.

Better Prospects for British Empire Steel

At the annual meeting of the British Empire Steel Corporation, held recently in Montreal, President Roy M. Wolvin pointed out the marked progress made in the physical operations of the company and also referred to the improvement in its internal conditions.

J. M. Macdonnell, of the National Trust Co., receiver for the Dominion Iron & Steel Co., said that in the first year of operation under receivership, which commenced July 2, 1926, substantial operating profits were made, showing considerable improvement over the year immediately preceding. Three interest payments on bonds have been made, totaling \$375,000; receivers' loans of \$2,500,000 have been paid off, and approximately \$500,000 remains as a balance on hand. The prospects for the future are good, and orders on hand now total 20,000 tons in excess of last year, thus assuring continuous operation well into the new year.

Directors of the British Empire company were re-elected with the exception of Hector McInnes and Sir A. Trevor Dawson, and C. S. Cameron, the new secretary-treasurer, was added to the board.

Iron and Steel Markets

Increased Purchases of Steel Bars

Hastened by Advance in Heavy Tonnage Products—Gain in
Rolling Mill Activity—More Rail Business—
Sheets and Strips Weak—Pig Iron Dull

STEEL market reports indicate that buyers accepted as timely, and perhaps reasonable, the \$1 a ton advance in plates, shapes and bars in which the Carnegie Steel Co. took the lead last Thursday. There are signs they are ready to welcome definite establishment of stability for its reaction on ultimate consumers. The price change was announced in turn by other makers, but not without giving purchasers opportunities to cover at the old quotation. The result was a spurt in bookings, particularly in bars, followed now by a lull.

In the lighter forms of steel, including sheets, strips and wire products, business has remained quiet and prices are in some cases quotably lower.

Counting all forms of steel except rails, which are active, orders for the first fifteen days of November are about equal in tonnage to those of the first half of October. Little or no expansion of buying is expected until the first half of December, when needs for 1928 may be covered without affecting year-end inventories.

Rolling mill activity shows a gain, maintained by drawing from recently stored stocks of ingots and semi-finished material. With present signs of a disposition to specify rather fully against orders, some stepping up of ingot production will be required inside of ten days to meet releases against rail orders.

Three railroads have added over 70,000 tons to rail mill bookings, the Frisco increasing its order by 40,000 tons, the Grand Trunk placing one lot of 11,000 tons and the Wabash distributing 20,000 tons. Fresh inquiries include 94,000 tons for the Southern Pacific, 37,500 tons for the Missouri Pacific, 14,400 tons for the Texas & Pacific and 10,000 tons for the International Great Northern. Track accessory business, which is slow in closing, amounts to fully 50,000 tons, including 20,000 to 25,000 tons of tie plates for the New York Central Lines.

Railroad car builders have submitted figures for some 15,000 cars for consideration under 1928 budgets.

The general run of structural steel projects booked was considerably below the recent average, but the award of 18,000 tons for a bridge at Cleveland raised the week's total to over 29,000 tons. Although fresh inquiries amounted to only 10,000 tons, reports are that a large tonnage will reach the market early next year. A bridge at San Francisco will require 8500 tons of concrete reinforcing bars.

Oil tanks continue to take plates in quantities

which help sustain production in the absence of railroad car demand. The Atlantic Refining Co. has bought 7000 tons for tanks in western Texas.

The Steel Corporation's export subsidiary sold 300,000 base boxes of tin plate for Canadian plants of the American Can Co. The naming of next season's domestic price on tin plate is expected shortly, and the trade is looking for a reduction of at least 25c. a box, partly in recognition of lower pig tin. Cannery look for heavy demands in 1928.

In the advance from 1.75c. to 1.80c., Pittsburgh, for the heavy tonnage products, which was followed by a like advance in Chicago and Birmingham, it appears that the effort is to make the condition of preference lie with the size of the order and not the size of the company, so that the new quotation is to apply only on orders of 100 tons and larger, smaller ones taking \$2 a ton more.

Extreme low prices of sheets and strips seem generally to go with grades and sizes calling for extras sufficient to help bring up the net return to the mill, but the fact remains that in the absence of automobile orders, for one thing, irregularities are marked. Prices of sheets have given way in Chicago and galvanized sheets are \$1 down, on a Pittsburgh basis. Automobile fender stock has been reduced \$4 a ton to 4.30c., Pittsburgh, for Nos. 17 to 21 gage, following a \$5 reduction last month.

Sales of sheets by the independent sheet makers fell off 24,000 tons in October from September. They amounted to 68.4 per cent of capacity, compared with 73.3 per cent in September. Production represented 71.7 per cent of capacity, compared with 62.6 per cent in the month preceding, and the percentages of shipments were 67.9 and 65.3 for the two months.

Low pig iron prices fail to hasten covering for first quarter requirements. A general belief persists that no advance in prices is imminent. However, one large Pittsburgh sanitary ware company is inquiring for 13,000 to 19,000 tons, and may buy more, for the first half. Many large consumers have measured requirements to Jan. 1 and are not buying for delivery beyond that date. Water shipments from Lake Erie furnaces continue to depress the Chicago market, but conditions are somewhat improved at St. Louis, with sales of 14,000 tons in the week. Alabama producers are well sold up for the remainder of the year.

THE IRON AGE pig iron composite price, due to some stiffening at Buffalo, is now \$17.63, in place of the \$17.54 of two preceding weeks. Finished steel is unchanged, the composite remaining at 2.293c. a lb. for the fourth week.

A Comparison of Prices

Advances Over the Previous Week in Heavy Type, Declines in Italics
At Date, One Week, One Month, and One Year Previous

Pig Iron, Per Gross Ton:	Nov. 15, 1927	Nov. 7, 1927	Oct. 18, 1927	Nov. 16, 1926
No. 2, fdy., Philadelphia...	\$19.76	\$19.76	\$19.76	\$23.26
No. 2, Valley furnace....	17.50	17.50	17.50	19.00
No. 2, Southern, Cin'tl....	19.69	19.69	20.94	23.69
No. 2, Birmingham.....	16.00	16.00	17.25	20.00
No. 2 foundry, Chicago*..	18.50	18.50	18.50	21.00
Basic, del'd eastern Pa. .	19.50	20.00	20.00	23.00
Basic, Valley furnace....	17.00	17.00	17.00	18.50
Valley Bessemer, del'd P'gh	19.76	19.76	19.76	21.76
Malleable, Chicago*.....	18.50	18.50	18.50	21.00
Malleable, Valley	17.50	17.50	17.50	19.00
Gray forge, Pittsburgh....	18.76	18.76	18.76	20.26
L. S. charcoal, Chicago....	27.04	27.04	27.04	27.04
Ferromanganese, furnace.	90.00	90.00	90.00	100.00

Rails, Billets, etc., Per Gross Ton:

O.-h. rails, heavy, at mill.	\$43.00	\$43.00	\$43.00	\$43.00
Light rails at mill.....	36.00	36.00	36.00	36.00
Bess. billets, Pittsburgh..	33.00	33.00	33.00	35.00
O.-h. billets, Pittsburgh...	33.00	33.00	33.00	35.00
O.-h. sheet bars, P'gh....	34.00	34.00	34.00	36.00
Forging billets, P'gh.....	38.00	38.00	38.00	40.00
O.-h. billets, Phila.	38.30	38.30	38.30	40.30
Wire rods, Pittsburgh....	41.00	42.00	43.00	45.00
	Cents	Cents	Cents	Cents
Skelp, grvd. steel, P'gh, lb.	1.75	1.75	1.75	1.90

Finished Iron and Steel,

Per Lb. to Large Buyers:	Cents	Cents	Cents	Cents
Iron bars, Philadelphia...	2.07	2.07	2.07	2.22
Iron bars, Chicago.....	1.85	1.85	1.85	2.00
Steel bars, Pittsburgh....	1.75	1.75	1.75	2.00
Steel bars, Chicago.....	1.85	1.85	1.85	2.10
Steel bars, New York....	2.09	2.09	2.09	2.34
Tank plates, Pittsburgh..	1.75	1.75	1.75	1.90
Tank plates, Chicago.....	1.85	1.85	1.85	2.10
Tank plates, New York...	2.09	2.09	2.09	2.24
Beams, Pittsburgh	1.75	1.75	1.75	2.00
Beams, Chicago	1.85	1.85	1.85	2.10
Beams, New York.....	2.09	2.09	2.09	2.34
Steel hoops, Pittsburgh...	2.30	2.30	2.30	2.50

*The average switching charge for delivery to foundries in the Chicago district is 61c. per ton.

On export business there are frequent variations from the above prices. Also, in domestic business, there is at times a range of prices on various products, as shown in our market reports on other pages.

Sheets, Nails and Wire,	Nov. 15, 1927	Nov. 7, 1927	Oct. 18, 1927	Nov. 16, 1926
Per Lb. to Large Buyers:	Cents	Cents	Cents	Cents
Sheets, black, No. 24, P'gh	2.80	2.80	2.90	3.00
Sheets, black, No. 24, Chi-				
cago dist. mill.....	2.90	3.00	3.00	3.20
Sheets, galv., No. 24, P'gh	3.65	3.70	3.75	3.85
Sheets, galv., No. 24, Chi-				
cago dist. mill.....	3.80	3.85	3.85	4.05
Sheets, blue, 9 & 10, P'gh	2.10	2.10	2.15	2.30
Sheets, blue, 9 & 10, Chi-				
cago dist. mill.....	2.20	2.25	2.30	2.50
Wire nails, Pittsburgh....	2.50	2.50	2.55	2.65
Wire nails, Chicago dist.				
mill	2.55	2.55	2.60	2.70
Plain wire, Pittsburgh....	2.40	2.40	2.40	2.50
Plain wire, Chicago dist.				
mill	2.45	2.45	2.45	2.55
Barbed wire, galv., P'gh..	3.20	3.20	3.25	3.35
Barbed wire, galv., Chi-				
cago dist. mill.....	3.25	3.25	3.30	3.40
Tin plate, 100 lb. box, P'gh	\$5.50	\$5.50	\$5.50	\$5.50

Old Material, Per Gross Ton:

Heavy melting steel, P'gh.	\$14.00	\$14.00	\$14.50	\$17.00
Heavy melting steel, Phila.	14.00	14.00	14.00	15.50
Heavy melting steel, Ch'go	11.50	11.50	11.50	13.00
Carwheels, Chicago	13.25	13.25	13.50	14.50
Carwheels, Philadelphia..	15.50	15.50	15.50	16.50
No. 1 cast, Pittsburgh....	14.25	14.25	14.75	16.50
No. 1 cast, Philadelphia..	16.00	16.00	16.50	17.50
No. 1 cast, Ch'go (net ton)	13.50	13.50	14.00	16.00
No. 1 RR. wrot, Phila....	15.25	15.25	15.50	17.00
No. 1 RR. wrot, Ch'go (net)	9.50	9.50	10.00	12.50

Coke, Connellsville, Per Net Ton at Oven:

Furnace coke, prompt....	\$2.75	\$2.75	\$2.85	\$4.25
Foundry coke, prompt....	3.75	4.00	4.00	5.50

Metals,

Per Lb. to Large Buyers:	Cents	Cents	Cents	Cents
Lake copper, New York...	13.55	13.37 1/2	13.25	14.00
Electrolytic copper, refinery	13.25	13.25	13.00	13.62 1/2
Zinc, St. Louis.....	5.07 1/2	5.65	6.05	7.25
Zinc, New York.....	6.02 1/2	6.00	6.40	7.60
Lead, St. Louis.....	6.00	6.00	6.05	7.80
Lead, New York.....	6.25	6.25	6.25	8.00
Tin (Stralts), New York..	57.00	56.62 1/2	58.62 1/2	71.00
Antimony (Asiatic), N. Y.	10.75	11.00	11.25	13.25

Pittsburgh

Price Advances Viewed as Indicating Determination of Mills To Operate More Profitably

PITTSBURGH, Nov. 15.—Steel manufacturers continue to take a more cheerful view of the situation. The week has not been remarkable for large accessions to order books or for an upswing in ingot production, so the explanation is probably to be found in the determination of mills to maintain more profitable prices, as evidenced by the advance announced Nov. 10 of \$1 per ton on plates, shapes and bars by the Carnegie Steel Co., which was quickly followed by other manufacturers. All that has been needed to change the mental attitude of the trade has been the demonstration that prices can be stabilized and that consumers are not unwilling to go along with the movement.

The immediate effect of the advance in the heavy tonnage products has been to drive in orders and specifications, with a particularly notable increase in steel bar commitments. In other directions new business in the past week has been quieter, if anything, than it was the week before. This development, however, has caused no loss of confidence in the future of the market.

The prospect for business from the motor car industry still has a tendency to glow and dim, but there is not a manufacturer serving that industry who does not expect a decided betterment with the coming of the national motor shows early in the new year.

As bearing on the local situation, attention is drawn to the fact that much of the business is developing in

the West, which means that eventually more business will come this way as the Western mills fill up. It is generally believed that the oil industry cannot be worse off than it has been, and that next spring will bring a demand for oil well pipe that has been largely lacking in the past six months.

It is also possible to feel more cheerful about the prospects when there is already some evidence of railroad car business, while the fact that production on 1928 rails has been begun probably means more track laying this winter than usual and an early increase in the demand for the accessories.

Gain in the operations of the steel industry is seen in rolling mills rather than in the steel works. Ingot production is holding where it has been for the past few weeks. The answer is found in the fact that the steel makers have been laying aside some crude steel over the past few months and this now is being worked up. This is an inventory consideration which is important to manufacturers in Ohio, who have to pay a rather heavy tax on inventories.

The cheerfulness in steel has been only mildly reflected in old materials and in pig iron and not at all in coal and coke. Scrap dealers appear to be taking a firmer stand. A large inquiry for foundry iron for the first half of 1928 is believed to have been inspired by a belief that more favorable prices could be obtained now than later.

Pig Iron.—The Standard Sanitary Mfg. Co. has entered the market for requirements of its several plants for the first half of next year. The formal inquiry mentions from 3000 to 9000 tons for the Pittsburgh and New Brighton, Pa., plants and 10,000 tons for the Louisville, Ky., plant. It is probable that actual purchases will run considerably in excess of the amounts named in the inquiry. This inquiry provides

all that is new in the pig iron market. Little or no open market interest is evident in the steel-making grades, and sales of foundry and malleable iron have been chiefly of single carloads to the melters who rarely buy ahead of their actual requirements. There are signs that the steel foundries are getting busier, but so far this has not brought a demand for iron. Makers still are holding to the prices they have been quoting for several weeks, but these do not mean much in absence of sizable sales. The situation should be clarified by the results attending the large foundry iron inquiry now before the market.

Ferroalloys.—Business in ferromanganese, spiegel-eisen and ferrosilicon suffers from the fact that consumers are not yet much interested in their 1928 requirements, and producers are waiting for buyers to come into the market before naming prices. Indications point to the maintenance of present prices on ferrosilicon, an advance in ferromanganese and slightly lower prices than a year ago on spiegeleisen. Specifications on contracts are a little heavier than they were a few weeks ago.

Semi-Finished Steel.—Demand for billets, slabs and sheet bars still is very light, and real activity is lacking in other forms of semi-finished steel, although the recent bookings of 100,000 tons or more of large diameter line pipe by the National Tube Co. means that a corresponding tonnage of wide skelp will be furnished by the Carnegie Steel Co. Local mills have found it necessary to meet a price of \$40, base Cleveland, on wire rod business in that city and in the territory in which Cleveland rather than Pittsburgh is the basing point. Locally, wire rod prices range from \$40 to \$42, the lower price being made to a few large consumers, while on Eastern shipments \$41, base Pittsburgh, appears to be the minimum.

Bars, Plates and Shapes.—The interesting event of the week is the announcement made Nov. 10 by the Carnegie Steel Co. of an advance of \$1 a ton, making these products 1.80c., Pittsburgh, for the larger lots and 1.90c. for small lots. All other makers in this and nearby districts have gone along with the advance, and these prices are being firmly maintained on new business. The real effect of the advance, however, appears to be in driving in a good deal of business that was pending and to stimulate specifications against lower-priced orders. Specifications for steel bars have improved notably since the advance was announced. Recent line pipe orders have provided a few mills with a backlog, but generally the demand for plates is slow. The largest structural award of the week, a viaduct at Cleveland, calling for more than 18,000 tons of steel, comes to this district, and it was needed to bolster a rather low rate of lettings to local shops. Firmness in plain material is not without some effect upon prices of fabricated steel.

Wire Products.—Activity is lacking, despite a price situation produced by a struggle for orders that ordinarily would tempt some speculative buying on the

premise that materially lower prices were not likely. There has been no formal abandonment of the June 27 price schedule, calling for \$2.55, base, per keg, Pittsburgh, for nails, but \$2.50 appears to be all that is obtainable and evidence is not lacking that less is being done in the efforts of makers to get business. Shading also extends to galvanized nails, some makers giving away part of the saving there is in spelter around its present prices, and concessions are available on other products in line with the weakness in rods. It is commonly said that there is no profit in any of the wire products at present prices.

Rails and Track Supplies.—The local rail mill of the Steel Corporation this week went into full production. This is almost a month earlier than usual, and is taken as an indication that the railroads plan to lay track during the winter if the weather permits. There is no corresponding activity in track accessories so far as the railroads tributary to Pittsburgh are concerned. Fairly good demand is noted for light section rails. Prices are not firm on spikes, but are holding on other items under this heading.

Tubular Goods.—The order books of two makers have been helped materially by the recent line pipe awards, but taking it by and large the market still is quiet on tubular goods. Recent price revisions appear to have corrected the irregularity previously prevailing, and producers take some encouragement from the fact that the oil situation, if no better than it has been, at least is no worse. It is generally believed that there will be definite betterment in the oil industry before spring. The United Producers Pipe Line Co., a subsidiary of the Transcontinental Oil Co., has completed a survey for an oil line to run from western Texas to the Houston ship canal, a distance of approximately 400 miles. More activity on the part of the railroads and the motor car builders is needed to help the tube market.

Sheets.—Makers in this district have not done as well in sales in the past week as in the few preceding weeks and charge the falling off to the unsettlement in prices, which seems to have encouraged buyers who were ready to place orders to hold back. On black sheets, 2.80c., base Pittsburgh, has become more common and even 2.75c. is being encountered, but that is said to be as low as any ordinary black sheets have been sold. A price of 2.65c. has been noted, but this is declared to have been on some special finishes, carrying full extras and yielding sellers almost as much as sales of ordinary black sheets at 3c. Weakness in galvanized sheets, which has made 3.65c., base Pittsburgh, the common price, is ascribed to the weakness of zinc; that metal is below 6c. per lb., compared with a somewhat higher price when a spread of 85c. per 100 lb. between black and galvanized sheets was first set up. The monthly report of the National Association of Sheet and Tin Plate Manufacturers for October discloses sales by independent companies reporting to that organization of 234,358 tons, production of 245,765 tons, shipments of 232,626 tons, unfilled orders of 308,-

THE IRON AGE Composite Prices

Finished Steel

Nov. 15, 1927, 2.293c. a Lb.

One week ago.....	2.293c.
One month ago.....	2.307c.
One year ago.....	2.453c.
10-year pre-war average.....	1.689c.

Based on steel bars, beams, tank plates, plain wire, open-hearth rails, black pipe and black sheets. These products constitute 86 per cent of the United States output of finished steel.

High		Low	
1927	2.453c., Jan. 4:	2.293c., Oct. 25	
1926	2.453c., Jan. 5:	2.403c., May 18	
1925	2.560c., Jan. 6:	2.396c., Aug. 18	
1924	2.789c., Jan. 15:	2.460c., Oct. 14	
1923	2.824c., Apr. 24:	2.446c., Jan. 2	

Pig Iron

Nov. 15, 1927, \$17.63 a Gross Ton

One week ago.....	\$17.54
One month ago.....	17.84
One year ago.....	20.13
10-year pre-war average.....	15.72

Based on average of basic iron at Valley furnace and foundry irons at Chicago, Philadelphia, Buffalo, Valley and Birmingham.

High		Low	
1927	\$19.71, Jan. 4:	\$17.54, Nov. 1	
1926	21.54, Jan. 5:	19.46, July 13	
1925	22.50, Jan. 13:	18.96, July 7	
1924	22.88, Feb. 26:	19.21, Nov. 3	
1923	30.86, Mar. 20:	20.77, Nov. 20	

Mill Prices of Finished Iron and Steel Products

Iron and Steel Bars

Soft Steel	Base Per Lb.
F.o.b. Pittsburgh mills.....	1.75c. to 1.80c.
F.o.b. Chicago.....	1.85c. to 1.90c.
Del'd Philadelphia.....	2.07c. to 2.12c.
Del'd New York.....	2.09c. to 2.14c.
Del'd Cleveland.....	1.99c.
F.o.b. Cleveland.....	1.80c.
F.o.b. Birmingham.....	1.95c. to 2.05c.
C.i.f. Pacific ports.....	2.35c.
F.o.b. San Francisco mills.....	2.55c. to 2.40c.
Billet Steel Reinforcing	
F.o.b. Pittsburgh mills.....	1.75c. to 1.90c.
F.o.b. Birmingham.....	2.00c. to 2.10c.
Rail Steel	
F.o.b. Chicago district mill.....	1.80c.
Iron	
Common iron, f.o.b. Chicago.....	1.85c. to 1.90c.
Refined iron, f.o.b. P'gh mills.....	2.75c.
Common iron, del'd Philadelphia.....	2.07c. to 2.12c.
Common iron, del'd New York.....	2.09c. to 2.14c.

Tank Plates

	Base Per Lb.
F.o.b. Pittsburgh mills.....	1.75c. to 1.80c.
F.o.b. Chicago.....	1.85c. to 1.90c.
F.o.b. Birmingham.....	1.95c. to 2.05c.
Del'd Cleveland.....	1.99c.
Del'd Philadelphia.....	2.07c. to 2.12c.
Del'd New York.....	2.09c. to 2.14c.
C.i.f. Pacific ports.....	2.30c. to 2.40c.

Structural Shapes

	Base Per Lb.
F.o.b. Pittsburgh mills.....	1.75c. to 1.80c.
F.o.b. Chicago.....	1.85c. to 1.90c.
F.o.b. Birmingham.....	1.90c. to 2.00c.
Del'd Cleveland.....	1.99c.
Del'd Philadelphia.....	2.07c. to 2.12c.
Del'd New York.....	2.09c. to 2.12c.
C.i.f. Pacific ports.....	2.35c. to 2.40c.

Hot-Rolled Flats (Hoops, Bands and Strips)

	Base Per Lb.
All gages, narrower than 6 in., P'gh.....	2.10c. to 2.30c.
All gages, 6 in. to 12 in., P'gh.....	1.90c. to 2.10c.
Nos. 13 and 14 gage, 12 in. to 14 in., P'gh.....	2.30c.
net.....	2.30c.
Nos. 15 and 16 gage, 12 in. to 14 in., P'gh.....	2.40c.
net.....	2.40c.
All gages, narrower than 6 in., Chicago.....	2.20c. to 2.40c.
All gages, 6 in. and wider, Chicago.....	2.20c. to 2.40c.
Cotton ties, per bundle 45-lb. out of stock.....	
f.o.b. Atlantic ports.....	\$1.21
Cotton ties, per bundle 45-lb. out of stock.....	
f.o.b. Gulf ports.....	\$1.30

*Mills follow plate or sheet prices according to gage on wider than 14 in.

Cold-Finished Steel

	Base Per Lb.
Bars, f.o.b. Pittsburgh mills.....	2.10c. to 2.20c.
Bars, f.o.b. Chicago.....	2.10c. to 2.20c.
Bars, Cleveland.....	2.10c. to 2.25c.
Shafting, ground, f.o.b. mill.....	*2.35c. to 2.80c.
Strips, under 12 in., 1 up to 3 tons, P'gh.....	3.00c. to 3.25c.
Strips, under 12 in., 1 up to 3 tons, Cleveland.....	3.00c. to 3.15c.
Strips, under 12 in., 1 up to 3 tons, del'd Chicago.....	3.55c.
Strips, under 12 in., 1 up to 3 tons, Worcester.....	3.40c.

*According to size.

Wire Products

(To jobbers in car lots, f.o.b. Pittsburgh and Cleveland)	Base Per Keg
Wire nails.....	\$2.50
Galvanized nails.....	4.50
Galvanized staples.....	3.20
Polished staples.....	2.95
Cement coated nails.....	2.50
Base Per 100 Lb.	
Bright plain wire, No. 9 gage.....	\$2.40
Annealed fence wire.....	2.55
Spring wire.....	3.40
Galv'd wire, No. 9.....	3.00
Barbed wire, galv'd.....	3.20
Barbed wire, painted.....	2.95
Chicago district mill and delivered Chicago prices are \$1 per ton above the foregoing. Birmingham mill prices \$3 a ton higher; Worcester, Mass., mill \$3 a ton higher on production of that plant; Duluth, Minn., mill \$2 a ton higher; Anderson, Ind., \$1 higher.	
Woven Wire Fence	Base to Retailers Per Net Ton
F.o.b. Pittsburgh.....	\$65.00
F.o.b. Cleveland.....	65.00
F.o.b. Anderson, Ind.....	66.00
F.o.b. Chicago district mills.....	67.00
F.o.b. Duluth.....	68.00
F.o.b. Birmingham.....	68.00

Sheets

Blue Annealed	Base Per Lb.
Nos. 9 and 10, f.o.b. Pittsburgh.....	2.10c. to 2.15c.
Nos. 9 and 10, f.o.b. Chicago dist. mill.....	2.20c. to 2.25c.
Nos. 9 and 10, del'd Cleveland.....	2.24c. to 2.29c.
Nos. 9 and 10, del'd Philadelphia.....	2.42c. to 2.47c.
Nos. 9 and 10, f.o.b. Birmingham.....	2.35c.

Box Annealed, One Pass Cold Rolled

No. 24, f.o.b. Pittsburgh.....	2.75c. to 2.90c.
No. 24, f.o.b. Chicago dist. mill.....	2.90c. to 2.95c.
No. 24, del'd Cleveland.....	2.94c. to 3.04c.
No. 24, del'd Philadelphia.....	3.07c. to 3.22c.
No. 24, f.o.b. Birmingham.....	3.10c.

Metal Furniture Sheets

No. 24, f.o.b. Pittsburgh, A grade.....	4.05c.
No. 24, f.o.b. Pittsburgh, B grade.....	3.85c.

Galvanized

No. 24, f.o.b. Pittsburgh.....	3.65c. to 3.75c.
No. 24, f.o.b. Chicago dist. mill.....	3.80c.
No. 24, del'd Cleveland.....	3.74½c. to 3.84c.
No. 24, del'd Philadelphia.....	3.97c. to 4.07c.
No. 24, f.o.b. Birmingham.....	3.95c. to 4.00c.

Tin Mill Black Plate

No. 28, f.o.b. Pittsburgh.....	2.90c. to 3.00c.
No. 28, f.o.b. Chicago dist. mill.....	3.00c. to 3.10c.

Automobile Body Sheets

No. 20, f.o.b. Pittsburgh.....	4.15c.
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Long Ternes

No. 28, 8-lb. coating, f.o.b. mill primes.....	4.20c.
No. 28, 8-lb. coating, f.o.b. mill unassorted.....	4.10c.

Tin Plate

Per Base Box	
Standard cokes, f.o.b. P'gh district mills.....	\$5.50
Standard cokes, f.o.b. Gary and Elwood, Ind.....	\$6.60

Terne Plate

(F.o.b. Morgantown or Pittsburgh)

(Per package, 20 x 28 in.)

8-lb. coating I.C. \$11.40	25-lb. coating I.C. \$17.30
15-lb. coating I.C. 14.45	30-lb. coating I.C. 18.75
20-lb. coating I.C. 15.80	40-lb. coating I.C. 20.85

Alloy Steel Bars

(F.o.b. Pittsburgh, Chicago or Ohio Mill)	
S. A. E. Series	
Numbers	Base Per 100 Lb.
2100* (½% Nickel, 0.10% to 0.20% Carbon).....	\$2.90 to \$3.00
2300 (¾% Nickel).....	4.00 to 4.20
2500 (5% Nickel).....	5.00 to 5.25
3100 (Nickel Chromium).....	3.00 to 3.20
3200 (Nickel Chromium).....	4.75 to 5.00
3300 (Nickel Chromium).....	6.75 to 7.00
3400 (Nickel Chromium).....	6.00 to 6.25
5100 (Chromium Steel).....	3.10 to 3.20
5200* (Chromium Steel).....	7.00 to 7.50
6100 (Chrom. Vanadium bars).....	4.00 to 4.20
6100 (Chrom. Vanad. spring steel).....	3.60 to 3.80
9250 (Silicon Manganese spring steel).....	3.00 to 3.15
Carbon Vanadium (0.45% to 0.55% Carbon, 0.15% Vanad.).....	4.10 to 4.20
Nickel Chrome Vanadium (0.60 Nickel, 0.50 Chrom., 0.15 Vanad.).....	4.10 to 4.30
Chromium Molybdenum bars (0.80—1.10 Chrom., 0.25—0.40 Molyb.).....	4.00 to 4.25
Chromium Molybdenum bars (0.50—0.70 Chrom., 0.15—0.25 Molyb.).....	3.10 to 3.20
Chromium Molybdenum spring steel (1—1.25 Chrom., 0.30—0.50 Molybdenum).....	4.50 to 4.75

Above prices are for hot-rolled steel bars, forging quality. The ordinary differential for cold-drawn bars is 1c. per lb. higher. For billets 4 x 4 to 10 x 10 in. the price for a gross ton is the net price for bars of the same analysis. For billets under 4 x 4 in. down to and including 2½-in. squares, the price is \$5 a gross ton above the 4 x 4 billet price.

*Not S. A. E. specification, but numbered by manufacturers to conform to S. A. E. system.

Rails

Per Gross Ton	
Standard, f.o.b. mill.....	\$48.00
Light (from billets), f.o.b. mill.....	36.00
Light (from rail steel), f.o.b. mill.....	34.00
Light (from billets), f.o.b. Ch'go mill.....	36.00

Track Equipment

	Base Per 100 Lb.
Spikes, ¾ in. and larger.....	\$2.75 to \$2.80
Spikes, ½ in. and smaller.....	\$2.80 to 3.00
Spikes, boat and barge.....	3.10
Tie plates, steel.....	2.25
Angle bars.....	2.75
Track bolts, to steam railroads.....	3.80 to 4.00
Track bolts, to jobbers, all sizes, per 100 count.....	70 per cent off list

Welded Pipe

Base Discounts, f.o.b. Pittsburgh District and Lorain, Ohio, Mills

Butt Weld			Iron		
Inches	Steel	Galv.	Inches	Black	Galv.
1/4	45	19 1/4	1/4 to 3/8	+11	+39
1/2 to 3/4	51	25 1/4	3/8	22	2
1	56	42 1/4	1	28	11
1 1/2	60	48 1/4	1 to 1 1/2	30	18
1 to 3	62	50 1/4			
Lap Weld					
2	56	48 1/4	2	23	7
2 1/2 to 6	59	47 1/4	3 1/2	26	11
7 and 8	56	48 1/4	3 to 6	28	18
9 and 10	45	32 1/4	7 to 12	26	11
11 and 12	53	40 1/4			
Butt Weld, extra strong, plain ends					
1/4	41	24 1/4	1/4 to 3/8	+19	+54
1/2 to 3/4	47	30 1/4	3/8	21	17
1	53	42 1/4	1	28	12
1 1/2	58	47 1/4	1 to 1 1/2	30	14
1 to 1 1/2	60	49 1/4			
2 to 3	61	50 1/4			
Lap Weld, extra strong, plain ends					
2	53	42 1/4	2	23	9
2 1/2 to 4	57	46 1/4	2 1/2 to 4	29	18
4 1/2 to 6	56	46 1/4	4 1/2 to 6	28	14
7 to 8	52	39 1/4	7 to 8	21	16
9 and 10	45	32 1/4	9 to 12	16	2
11 and 12	44	31 1/4			

To the large jobbing trade the above discounts on steel pipe are increased on black by one point, with supplementary discount of 5 and 5%, and on galvanized by 1½ points, with supplementary discount of 5%. On iron pipe, both black and galvanized, the above discounts are increased to large jobbers by one point with supplementary discounts of 5 and 2½%.

Note.—Chicago district mills have a base two points less than the above discounts. Chicago delivered base is 2½ points less. Freight is figured from Pittsburgh, Lorain, Ohio, and Chicago district mills, the billing being from the point producing the lowest price to destination.

Boiler Tubes

Base Discounts, f.o.b. Pittsburgh

Lap Welded Steel	Charcoal Iron
2 to 2 1/2 in.	1 1/2 in. +18
2 1/2 to 3 in.	1 1/2 to 1 3/4 in. +8
3 in.	2 to 2 1/2 in. -2
3 1/2 to 3 3/4 in.	2 1/2 to 3 in. -7
4 to 13 in.	3 1/2 to 4 1/2 in. -9

Beyond the above discounts, 7 fives extra are given on lap welded steel tubes and 2 tens to 2 tens and 1 five on charcoal iron tubes.

Standard Commercial Seamless Boiler Tubes

Cold Drawn	
1 in.	60
1 1/4 to 1 1/2 in.	52
1 1/2 in.	36
2 to 2 1/2 in.	31
2 1/2 to 2 3/4 in.	39
3 in.	51
3 1/2 and 3 3/4 in.	55
4 in.	56
4 1/2, 5 and 6 in.	51

Hot Rolled

2 and 2 1/4 in.	37
2 1/2 and 2 3/4 in.	45
3 in.	51

Less carloads, 4 points less. Add \$8 per net ton for more than four gages heavier than standard. No extra for lengths up to and including 24 ft. Sizes smaller than 1 in. and lighter than standard gage to be held at mechanical tubes list and discount. Intermediate sizes and gages not listed take price of next larger outside diameter and heavier gage.

Seamless Mechanical Tubing

Per Cent Off List

Carbon, 0.10% to 0.30%, base.....	55
Carbon, 0.30% to 0.40%, base.....	50

Plus differentials for lengths over 18 ft. and for commercially exact lengths. Warehouse discounts on small lots are less than the above.

264 tons, unshipped stocks of 95,462 tons and unsold stocks of 50,518 tons. Sales fell approximately 24,000 tons under those of September, but shipments showed an increase of slightly more than 2000 tons. Taking shipments to be the best picture of actual business, October was a better month than September by just a little under 1 per cent. October production ran approximately 25,000 tons ahead of that of the month before. Unfilled orders at the end of October were almost 42,000 tons less than one month before. Under the revised method of calculation, which rates sheet mills at 8.67 tons per turn and jobbing mills at 22.56 tons per turn, October sales were 68.4 per cent of capacity; production, 71.7 per cent; shipments, 67.9 per cent; unfilled orders, 89.9 per cent; unshipped stocks, 27.9 per cent, and unsold stocks, 14.7 per cent.

Tin Plate.—The market still is waiting for the announcement of prices for the first half of next year, which is expected late this week or early next week. Such indications as there are in the way of prices of tin and black plate suggest a decline in the base price. Current demands are moderate, but the leading producer had a fairly good week as a result of the booking of one good-sized export order.

Cold-Finished Steel Bars and Shafting.—There is a fair demand for screw stock but it is not of such proportions as to indicate much quickening in the production of motor cars. The Chevrolet division of General Motors Corporation is reported to have a good-sized tonnage to place for a new car that will appear coincident with the new Ford model. Prices are holding at recent levels.

Bolts, Nuts and Rivets.—There has been a slight pickup in the demand for bolts and nuts but the market cannot be called active. Prices are firm. There is some uncertainty in large rivet prices, but important producers still are holding at \$3, base, per 100 lb. on new business. Few buyers, however, missed the opportunity to sign contracts which they now can draw upon at a price \$5 per ton less.

Hot Rolled Flats.—Total bookings for this month have run slightly ahead of the same period in October but the market still lacks real activity and a change is not expected until the Ford Motor Co. comes into the market and general automotive industry demands are heavier. Price irregularities still exist, and while makers here still are maintaining 2.30c., base, on cooperation stock, they are not so successful on narrow material for other uses. The prevailing prices on narrow strips are 2.15c. to 2.20c. and even less has been done in cases where buyers take both narrow and wide stock. On strips 6 in. to 12 in. 1.95c. is fairly common. Strips 12 in. and wider and No. 12 gage and heavier have been advanced \$1 per ton in keeping with the advance made last week on plates with which they compete.

Cold Rolled Strips.—Makers here still have a quotation of 3.25c., base, but are not as successful as re-

cently in making sales at that price. Actually, 3.15c. is the more common maximum and in the Detroit district 3c., base, for one to less than three tons is the ruling price. The market is doing better on sales this month as compared with October but is not active.

Coke and Coal.—The effort of coke producers still is to bring supply and demand into line through a curtailment of production, but cutting production to fit the demand is not a rapid process and a good deal of coke, both furnace and foundry grades, is seeking a prompt outlet. The result is that spot furnace coke now only rarely goes at more than \$2.75 per net ton at ovens and an increasing number of sales of 72-hr. coke are at or near the minimum quotations. Coal producers still are struggling to find a market for their production. Industrial demands are light for the time of year and unseasonably warm weather has curtailed the demand for household fuel. Quotations are merely asking prices, since to maintain working organizations the operators must produce and then must of necessity sell for the best prices they can obtain. Prices are unprofitable even for the producers who have succeeded in getting men to work for low wages.

Old Material.—No appreciable increase in consumer interest has developed, but some of the weakness has disappeared since the offerings of scrap are smaller at present levels, and dealers feel that recent improvement in finished steel business warrants a little firmer price stand. Small tonnages of heavy melting steel are to be had by dealers or consumers at \$14, but a large tonnage probably would not be sold that low. A quickening in the operations of steel foundries has produced sufficient demand for railroad scrap specialties to lift prices fully 50c. a ton. Railroad knuckles and couplers and coil and leaf springs have sold at \$16 and \$16.25 to consumers and now are held at \$16.50. In other grades, the prices of a week ago continue, but in a market as dull as the present one they are merely appraisals of what might be done.

Prices per gross ton delivered consumers' yards in Pittsburgh and points taking the Pittsburgh district freight rate:

Basic Open-Hearth Furnace Grades:

Heavy melting steel.....	\$14.00 to \$14.50
Scrap rails	13.50 to 14.00
Compressed sheet steel.....	13.50 to 14.00
Bundled sheets, sides and ends...	12.75 to 13.00
Cast iron car wheels.....	14.00 to 14.50
Sheet bar crops, ordinary.....	14.50
Heavy breakable cast.....	13.25 to 13.75
No. 2 railroad wrought.....	14.00 to 14.50
Heavy steel axle turnings.....	13.00 to 13.50
Machine shop turnings.....	11.00 to 11.50

Acid Open-Hearth Furnace Grades:

Railroad knuckles and couplers..	16.00 to 16.50
Railroad coil and leaf springs..	16.00 to 16.50
Rolled steel wheels.....	16.00 to 16.50
Low phosphorus billet and bloom ends	18.00 to 19.00
Low phosphorus, mill plate.....	17.00 to 18.00
Low phosphorus, light grade.....	16.00 to 17.00
Low phosphorus sheet bar crops.....	17.00 to 18.00
Heavy steel axle turnings.....	13.00 to 13.50

Electric Furnace Grades:

Low phosphorus punchings.....	16.50 to 17.00
Heavy steel axle turnings.....	13.00 to 13.50

Blast Furnace Grades:

Short shoveling steel turnings...	11.00 to 11.50
Short mixed borings and turnings	11.00 to 11.50
Cast iron borings.....	11.00 to 11.50
No. 2 busheling.....	8.00 to 8.50

Rolling Mill Grades:

Steel car axles.....	18.00 to 19.00
No. 1 railroad wrought.....	11.00 to 11.50
Sheet bar crops.....	17.00 to 17.50

Cupola Grades:

No. 1 cast.....	14.25 to 14.75
Rails 3 ft. and under.....	15.00 to 15.50

Malleable Grades:

Railroad	14.00 to 14.50
Industrial	13.50 to 14.00
Agricultural	13.00 to 13.50

Warehouse Prices, f.o.b. Pittsburgh

Base per Lb.

Plates	3.00c.
Structural shapes	3.00c.
Soft steel bars and small shapes.....	2.90c.
Reinforcing steel bars.....	2.75c.
Cold-finished and screw stock—	
Rounds and hexagons.....	3.60c.
Squares and flats.....	4.10c.
Bands	3.60c.
Hoops	4.00c. to 4.50c.
Black sheets (No. 24 gage), 25 or more bundles	3.65c.
Galvanized sheets (No. 24 gage), 25 or more bundles	4.50c.
Blue annealed sheets (No. 10 gage), 25 or more sheets	3.20c.
Spikes, large	3.30c. to 3.40c.
Small	3.80c. to 5.25c.
Boat	3.80c.
Track bolts, all sizes, per 100 count, 62½ per cent off list	
Machine bolts, per 100 count, 62½ per cent off list	
Carriage bolts, per 100 count, 62½ per cent off list	
Nuts, all styles, per 100 count, 62½ per cent off list	
Large rivets, base per 100 lb.....	\$3.50
Wire, black soft annealed, base per 100 lb....	2.90
Wire, galvanized soft, base per 100 lb....	2.90
Common wire nails, per keg.....	\$2.80 to 2.90
Cement coated nails, per keg.....	2.85 to 2.95

The Superior Steel Corporation, Pittsburgh, has concluded an arrangement with Peter A. Frasse & Co., Inc., to distribute its strip steel through its warehouses in New York, Hartford and Philadelphia, and also to act as exclusive mill sales representative in the New York metropolitan district and special representative in New England and the Atlantic seaboard States, under the direction of the Eastern sales manager of Superior Steel Corporation.

Semi-Finished Steel, Raw Materials, Bolts and Rivets

Mill Prices of Semi-Finished Steel

F.o.b. Pittsburgh or Youngstown

Billets and Blooms	
	Per Gross Ton
Rerolling, 4-in. and over.....	\$33.00
Rerolling, under 4-in. to and including 1½ in.	\$33.50 to 34.00
Forging, ordinary	38.00 to 39.00
Forging, guaranteed	43.00 to 44.00

Sheet Bars	
	Per Gross Ton
Open-hearth or Bessemer.....	\$34.00

Slabs	
	Per Gross Ton
8 in. x 2 in. and larger.....	\$33.00
Smaller than 8 in. x 2 in.	34.00

Skelp	
	Per Lb.
Grooved	1.75c. to 1.80c.
Sheared	1.75c. to 1.80c.
Universal	1.75c. to 1.80c.

Wire Rods	
	Per Gross Ton
*Common soft, base.....	\$40.00 to \$42.00
Screw stock	\$5.00 per ton over base
Carbon 0.20% to 0.40%	3.00 per ton over base
Carbon 0.41% to 0.55%	5.00 per ton over base
Carbon 0.56% to 0.75%	7.50 per ton over base
Carbon over 0.75%	10.00 per ton over base
Acid	15.00 per ton over base

*Chicago mill base is \$42 to \$43. Cleveland mill base, \$40.

Prices of Raw Material

Ores	
Lake Superior Ores, Delivered Lower Lake Ports	
	Per Gross Ton
Old range Bessemer, 51.50% iron.....	\$4.55
Old range non-Bessemer, 51.50% iron.....	4.40
Mesabi Bessemer, 51.50% iron.....	4.40
Mesabi non-Bessemer, 51.50% iron.....	4.25
High phosphorus, 51.50% iron.....	4.15
Foreign Ore, c.i.f. Philadelphia or Baltimore	
	Per Unit
Iron ore, low phos., copper free, 55 to 58% iron in dry Spanish or Algeria.....	10.50c.
Iron ore, Swedish, average 66% iron, 9.75c. to 10.00c.	
Manganese ore, washed, 52% manganese, from the Caucasus.....	39c. to 40c.
Manganese ore, Brazilian, African or Indian, basis 50%	38c. to 39c.
Tungsten ore, high grade, per unit, in 60% concentrates	\$10.10 to \$10.35
Per Gross Ton	
Chrome ore, 45 to 50% Cr ₂ O ₃ , crude, c.i.f. Atlantic seaboard	\$22.00 to \$24.00
Per Lb.	
Molybdenum ore, 85% concentrates of MoS ₂ , delivered	50c. to 55c.

Coke	
	Per Net Ton
Furnace, f.o.b. Connellsville prompt	\$2.75 to \$3.00
Foundry, f.o.b. Connellsville prompt	3.75 to 4.50
Foundry, by-product, Ch'go ovens	9.00
Foundry, by-product, New England, del'd	12.00
Foundry, by-product, Newark or Jersey City, delivered.....	9.46 to 10.77
Foundry, Birmingham	5.00
Foundry, by-product, St. Louis....	9.75

Coal	
	Per Net Ton
Mine run steam coal, f.o.b. W. Pa. mines	\$1.40 to \$1.90
Mine run coking coal, f.o.b. W. Pa. mines	1.65 to 1.85
Mine run gas coal, f.o.b. Pa. mines	1.25 to 2.00
Steam slack, f.o.b. W. Pa. mines....	0.90 to 1.00
Gas slack, f.o.b. W. Pa. mines....	1.00 to 1.10

Ferromanganese	
	Per Gross Ton
Domestic, 80%, furnace or seab'd.....	\$90.00
Foreign, 80%, Atlantic or Gulf port, duty paid	90.00

Spiegeleisen	
	Per Gross Ton Furnace
Domestic, 19 to 21%	\$30.00 to \$31.00
Domestic, 16 to 19%	29.00 to 30.00

Electric Ferrosilicon	
	Per Gross Ton Delivered
50%	\$85.00 to \$87.50
75%	145.00

Per Gross Ton Furnace	
10%	\$35.00
11%	37.00

Bessemer Ferrosilicon	
F.o.b. Jackson County, Ohio, Furnace	
	Per Gross Ton
10%	\$32.00
11%	34.00

Silvery Iron	
F.o.b. Jackson County, Ohio, Furnace	
	Per Gross Ton
6%	\$25.00
7%	26.00
8%	27.00
9%	28.00

Other Ferroalloys	
Ferrotungsten, per lb. contained metal, del'd	93c. to 95c.
Ferromanganese, 4 to 6% carbon and up, 65 to 70% Cr., per lb. contained Cr. delivered, in carloads.....	11.50c.
Ferrovandium, per lb. contained vanadium, f.o.b. furnace	\$3.15 to \$3.65
Ferrocobalt, 15 to 18%, per net ton, f.o.b. furnace, in carloads.....	\$200.00
Ferrophosphorus, electric or blast furnace material, in carloads, 18% Rockdale, Tenn., base, per net ton.....	\$91.00
Ferrophosphorus, electric, 24%, f.o.b. Anniston, Ala., per net ton.....	\$122.50

Fluxes and Refractories

Fluorspar	
	Per Net Ton
Domestic, 85% and over calcium fluoride, not over 5% silica, gravel, f.o.b. Illinois and Kentucky mines.....	\$16.00
No. 2 lump, Illinois and Kentucky mines.....	\$20.00
Foreign, 85% calcium fluoride, not over 5% silica, c.i.f. Atlantic port, duty paid.....	\$16.00
Domestic, No. 1 ground bulk, 95 to 98% calcium fluoride, not over 2½% silica, f.o.b. Illinois and Kentucky mines.....	\$32.50

Fire Clay	
Per 1000 f.o.b. Works	
First Quality	Second Quality
Pennsylvania ...	\$43.00 to \$46.00
Maryland	43.00 to 46.00
New Jersey ...	50.00 to 65.00
Ohio	43.00 to 46.00
Kentucky	43.00 to 46.00
Missouri	43.00 to 46.00
Illinois	43.00 to 46.00
Ground fire clay, per ton	7.00

Silica Brick	
Per 1000 f.o.b. Works	
Pennsylvania	\$43.00
Chicago	52.00
Birmingham	50.00
Silica clay, per ton.....	\$8.50 to 10.00

Magnesite Brick	
Per Net Ton	
Standard sizes, f.o.b. Baltimore and Chester, Pa.	\$65.00
Grain magnesite, f.o.b. Baltimore and Chester, Pa.	40.00

Chrome Brick	
	Per Net Ton
Standard size	\$45.00

Mill Prices of Bolts, Nuts, Rivets and Set Screws

Bolts and Nuts	
Per 100 Pieces	
(F.o.b. Pittsburgh, Cleveland, Birmingham or Chicago)	
	Per Cent Off List
†Machine bolts	70
†Carriage bolts	70
Lag bolts	70
Plow bolts, Nos. 1, 2, 3 and 7 heads.....	70
Hot-pressed nuts, blank or tapped, square....	70
Hot-pressed nuts, blank or tapped, hexagon....	70
C.p.c. and t. square or hex. nuts, blank or tapped	70
Washers*	6.75c. to 6.50c. per lb. off list

*F.o.b. Chicago, New York and Pittsburgh. †Bolts with rolled threads up to and including ½ in. x 6 in. take 10 per cent lower list prices.

Bolts and Nuts	
Per Cent Off List	
Semi-finished hexagon nuts.....	70
Semi-finished hexagon castellated nuts, S.A.E.	70
Stove bolts in packages.....	80, 10 and 5
Stove bolts in bulk.....	80, 10, 5 and 2½
Tire bolts	60, 5 and 5

Discount of 70 per cent off on bolts and nuts applies on carload business. For less than carload orders discounts of 55 to 60 per cent apply.

Large Rivets	
(½-In. and Larger)	
	Base per 100 Lb.
F.o.b. Pittsburgh or Cleveland.....	\$2.75 to \$3.00
F.o.b. Chicago	2.85 to 3.10

Small Rivets	
(¾-In. and Smaller)	
	Per Cent Off List
F.o.b. Pittsburgh	70, 10 and 5
F.o.b. Cleveland	70, 10 and 5 to 70 and 10
F.o.b. Chicago	70, 10, 10 and 5 to 70 and 10

Cap and Set Screws	
(Freight allowed up to but not exceeding 50c. per 100 lb. on lots of 200 lb. or more)	
	Per Cent Off List
Milled cap screws.....	80, 10 and 10
Milled standard set screws, case hardened, 80 and 10	80
Milled headless set screws, cut thread.....	80
Upset hex. head cap screws, U.S.S. thread, 85 and 5	85 and 5
Upset set screws, S.A.E. thread.....	80, 10 and 10
Milled studs	70 and 5

Chicago

Purchase of 15,000 Cars in Prospect— Plates, Shapes and Bars Higher

CHICAGO, Nov. 15.—Figures submitted to railroads by car builders indicate that at least 15,000 cars are up for consideration on 1928 budgets. Estimated requirements include 2200 to 3500 for the Louisville & Nashville and 3200 for the Rock Island. Meanwhile, inquiry before the trade is marking time. Business in prospect from the Chicago & North Western is good, but the inquiry from the Pere Marquette is lifeless and the Cudahy Packing Co. is undecided whether to build, rent or purchase 200 refrigerator cars.

Price advances of \$1 a ton on heavy hot-rolled steel have been put in effect by Western producers. Plates, shapes and bars are now quoted at 1.90c., Chicago, in large tonnages and at 2c. on orders of less than 100 tons each. Changes in prices were not made without giving purchasers an opportunity to cover at the old quotations, with the result that a spurt in buying has been followed by a lull during which no real test has been given the new schedule.

The Atlantic Refining Co. has ordered 7000 tons of oil tankage plates for delivery into west Texas. Competition for that business was unusually keen and prices are reported to have been low.

Rolling schedules on 1928 rail contracts are now arranged and the indications are that ingot output will be advanced before the end of the coming week. One producer has been holding two furnaces banked for several weeks in anticipation of this move and at another plant a stack that has been undergoing extensive repairs for several months is now being dried.

Pig Iron.—Interest in new buying is lacking and water shipments from Lake Erie ports continue to bring pressure to bear on prices that local furnaces are trying to support. A 3000-ton cargo was unloaded this week and another boat is expected to arrive in the next few days. A part of this iron was disposed of in advance, but the remainder must be sold on arrival because of lack of storage facilities. Quick sales of this kind are usually at \$18, which is also the price at which several contracts for iron shipped by boat have been made. Fresh inquiry includes 3000 tons by a western Michigan melter and 800 tons for a foundry at Joliet, Ill. Several small sales of Bessemer ferro-silicon are reported at \$46.79, delivered. Southern iron is quiet.

Prices per gross ton at Chicago:

Northern No. 2 foundry, sil. 1.75 to 2.25	\$18.50
N'th'n No. 1 fdy. sil. 2.25 to 2.75	19.00
Malleable, not over 2.25 sil.	18.50
High phosphorus	18.50
Lake Superior charcoal, averaging sil. 1.50	27.04
Southern No. 2 fdy. (all rail)	22.01
Southern No. 2 (barge and rail)	20.18
Low phos., sil. 1 to 2 per cent, copper free	\$30.50 to 31.00
Silver, sil. 8 per cent	31.79
Bessemer ferro-silicon, 14 to 15 per cent	46.79

Prices are delivered consumers' yards except on Northern foundry, high phosphorus and malleable which are f.o.b. local furnace, not including an average switching charge of 61c. per gross ton.

Ferroalloys.—Ferromanganese is moving only in carload lots at \$90, seaboard, or \$97.56, delivered at Chicago. Books for 1928 have not been opened on ferro-silicon and current quotations are at \$87.50 for deliveries during the remainder of this year. Little interest is being shown by users of spiegeleisen, which is being quoted at \$31, Hazzard, Pa., in carload lots.

Prices delivered Chicago: 80 per cent ferromanganese, \$97.56; 50 per cent ferro-silicon, \$85 to \$87.50; spiegeleisen, 18 to 22 per cent, \$37.76 to \$38.76.

Plates.—Further interest is added to the railroad equipment market by the report that the Louisville & Nashville will soon ask for prices on 2500 miscellaneous freight cars. It is too early to expect definite action on the recent inquiry by the Chicago & North Western. It is reported that the Pere Marquette will not buy now the 500 to 1000 cars it inquired for some weeks ago.

The Cudahy Packing Co. is slow in placing orders for 200 refrigerator cars. Although production of crude oil is being controlled to some extent, large quantities are still going into storage, necessitating the construction of more tanks. An order this week from a Texas producer calls for 7000 tons of plates. Business of this character, plus the demand from miscellaneous users, is holding plate production in this district a trifle higher than the current rate of ingot output. This is an unusual situation in view of the fact that car builders are lending very little support to the market. Local producers are naming 1.90c., Chicago, as the price on plates in tonnage lots and 2c. for orders of less than 100 tons each. These prices have not been tested, and in the meantime shipments are going forward against business that was booked at the lower level.

Mill prices on plates per lb.: 1.85c. to 1.90c., base, Chicago.

Structural Material.—Local producers have named 1.90c., Chicago, as the new price for tonnage lots and 2c. for orders of less than 100 tons. Some sellers representing mills in other districts have not been advised of a change in price, leaving the market, at least for the time being, at 1.85c. to 1.90c. Building contracts cannot be characterized as active, but they are of the order that will give aid to the smaller fabricating shops. Of 1200 tons placed in the week, the largest single order was for 300 tons. The general level of shop operations remains steady. Large fabricators find that books are unusually light for this time of the year and that backlogs are diminishing rapidly. Fresh inquiry totals 2700 tons, including two buildings in Wisconsin and a 10-story office structure at Tucson, Ariz.

Mill prices on plain material per lb.: 1.85c. to 1.90c., base, Chicago.

Cast Iron Pipe.—Prices of this commodity are a trifle above the low of last week, but the range is now definitely established between closer limits. Sales this week in 6-in. and 24-in. pipe are at \$34.90 and \$34.70, respectively, delivered at Chicago, or \$26.70 and \$26.50, Birmingham. The United States Cast Iron Pipe & Foundry Co. has taken 5880 tons of 30-in. to 54-in. pipe for Chicago. James B. Clow & Sons booked the 400 tons of 6-in. pipe at \$34.90, delivered, and the National Cast Iron Pipe Co. took 210 tons of 24-in. pipe at \$34.70, delivered. Halfway, Mich., has awarded 52,000 ft. of 6-in. and 8-in. pipe to F. A. Warblow, a local contractor, who is reported to have ordered the pipe from the National Cast Iron Pipe Co. John A. McDace, a contractor at Detroit, is low bidder on 13,000 ft. of 6 to 12-in. pipe for Wayne County, Mich. T. H. Iglehart, Chicago, has been awarded the general contract by Downer's Grove, Ill., for laying about 35,000 ft. of 6 to 12-in. pipe. Contractors have been fairly active in the week. About 30 days of pipe laying weather is still to be expected in this district. Public lettings are less numerous and public utilities appear to have covered for their immediate requirements.

Prices per net ton, delivered Chicago: Water pipe, 6-in. and over, \$34.70 to \$35.20; 4-in., \$38.70 to \$39.20; Class A and gas pipe, \$4 extra.

Rails and Track Supplies.—Chicago producers of standard section rails estimate that not less than 100,000 tons in which they will participate is on inquiry. This does not include the 94,000 tons sought by the Southern Pacific, for it is conceded that orders for that tonnage will go to mills to the south and west of Chicago. Fresh inquiry tributary to local mills comes from two railroads for a total of 55,000 tons. Estimates place track accessories now before the trade at 40,000 tons. Orders for these commodities are slow in reaching mills. The indications are that releases against 1928 rail contracts will afford a higher rate of ingot output in this district in the next week or 10 days. Orders for light rails are scattered and small.

Prices f.o.b. mill, per gross ton: Standard-section open-hearth and Bessemer rails, \$43; light rails, rolled from billets, \$36. Per lb.: Standard railroad spikes, 2.80c.; track bolts with square nuts, 3.80c.; steel tie plates, 2.25c.; angle bars, 2.75c.

Bars.—In line with plates and shapes, Chicago producers have advanced soft steel bars to 1.90c. for large tonnages and to 2c. for lots of less than 100 tons. The advance of \$1 a ton has not been made by all sellers of this commodity. Buying was comparatively brisk just prior to the increase in price, but the last few days

have been quiet and there has been no test of the new prices. Shipments of billet steel bars are steady, largely because of the wide range of uses. Forging plants are holding the slight gain in output made a week ago. Tractor plants are still engaged at close to capacity, but orders from warehouses have tapered measurably. In line with the advance of the heavy tonnage steel products, producers of iron bars are now quoting 1.90c., Chicago. The principal users of this commodity are under contract and spot buying is hardly of sufficient size to test an advance in prices. Producers of rail steel bars quote 1.80c., Chicago Heights mills. New buying continues to drag and backlogs are diminishing. Specifications are not up to the average in October, but are in such volume as to warrant the continuation of double turn operation at both mills. Orders on books and the practice of carrying stocks at producing points give promise of steady production well into the winter months.

Mill prices per lb.: Soft steel bars, 1.85c. to 1.90c., base, Chicago; common bar iron, 1.85c. to 1.90c., base, Chicago; rail steel bars, 1.80c., base, Chicago.

Sheets.—Prices of this commodity continue to give ground. Chicago delivered prices are 2.25c. to 2.30c. on blue annealed sheets, 2.95c. to 3c. on black and 3.85c. on galvanized. Orders are light. Early in the week hot mill production was cut to 65 per cent. It is not uncommon for large buyers to place two small orders in a week. The demand for rush shipments is insistent, and a fair portion of going business is being placed on the basis of promised delivery. Distribution of sheets by warehouses is in small volume and refill orders from that source are light.

Base prices per lb., delivered from mill in Chicago: No. 24 black, 2.95c. to 3c.; No. 24 galvanized, 3.85c.; No. 10 blue annealed, 2.25c. to 2.30c. Delivered prices at other Western points are equal to the freight from Gary plus the mill prices, which are 5c. per 100 lb. lower than the Chicago delivered prices.

Bolts, Nuts and Rivets.—This market is without feature. Large rivets are holding at \$3.10 on spot business and discounts on small rivets are unchanged.

Wire Products.—Weakness in nail prices is in further evidence and the price of \$2.60, Chicago, is rapidly disappearing. The tendency to buy at close range has had a marked effect on orders taken, following the announcement of spring terms on fencing. Only a few buyers have taken advantage of the special terms. Orders from the South are in good volume, but business in the Middle West is spotty. Specifications from the railroads are somewhat heavier, but this is offset by the lighter requirements of the manufacturing trade.

Reinforcing Bars.—November sales in concrete reinforcement are in good volume, and fresh inquiry and business to be placed give brighter prospects than is usually to be expected at this time of the year. Over 800 tons of billet steel bars have been sold for the James S. Kirk & Co. factory. Total sales for the week exceed 1700 tons. Noteworthy among fresh inquiries is an apartment building at Glenlake Avenue and Sheridan Road, Chicago, which will take 900 tons. Prices of reinforcing bars are not steady. Common quotations on the billet commodity range 2.20c. to 2.55c. out of the

Chicago warehouses. Prices on rail steel reinforcing bars are 1.85c. to 1.90c. Fresh inquiry and recent awards are shown on page 1416.

Coke.—Chicago producers of by-product foundry coke are holding spot prices at \$9, local ovens, and at \$9.50, delivered in the switching district. Prices have not been announced on 1928 deliveries.

Old Material.—Activity in the Chicago scrap market is at low ebb. Sales in the week were unusually few in number and for small tonnages, affording little by which to gage price levels. The tendency, however, is toward weakness in all grades. Demand by foundries is light, and prices of all cast grades are unstable. Except for the small movement of scrap, this market affords dealers a greater opportunity for a fair margin of profit than was the case last summer and in the early fall months. For several weeks it has been possible to cover orders at prices below those written in contracts. Little scrap is being prepared in yards and operators are hesitating to add to stocks that are on hand. The Rock Island will sell 8000 tons.

Prices delivered consumers' yards, Chicago:

Per Gross Ton	
Basic Open-Hearth Grades:	
Heavy melting steel.....	\$11.50 to \$12.00
Shoveling steel.....	11.50 to 12.00
Frogs, switches and guards, cut apart, and miscellaneous rails.....	12.75 to 13.25
Hydraulic compressed sheets.....	10.00 to 10.50
Drop forge flashings.....	9.00 to 9.50
Forged, cast and rolled steel car wheels.....	14.00 to 14.50
Railroad tires, charging box size.....	14.00 to 14.50
Railroad leaf springs, cut apart.....	14.00 to 14.50
Acid Open-Hearth Grades:	
Steel couplers and knuckles.....	13.00 to 13.50
Coil springs.....	14.75 to 15.25
Low phosphorus punchings.....	13.00 to 13.50
Electric Furnace Grades:	
Axle turnings.....	11.50 to 12.00
Blast Furnace Grades:	
Axle turnings.....	10.00 to 10.50
Cast iron borings.....	9.50 to 10.00
Short shoveling turnings.....	9.50 to 10.00
Machine shop turnings.....	7.00 to 7.50
Rolling Mill Grades:	
Iron rails.....	13.00 to 13.50
Rerolling rails.....	13.50 to 14.00
Cupola Grades:	
Steel rails less than 3 ft.....	14.50 to 15.00
Angle bars, steel.....	13.25 to 13.75
Cast iron car wheels.....	13.25 to 13.75
Malleable Grades:	
Railroad.....	12.50 to 13.00
Agricultural.....	12.00 to 12.50
Miscellaneous:	
*Relaying rails, 56 to 60 lb.....	23.00 to 25.00
*Relaying rails, 65 lb. and heavier.....	26.00 to 31.00
Per Net Ton	
Rolling Mill Grades:	
Iron angle and splice bars.....	13.50 to 14.00
Iron arch bars and transoms.....	17.75 to 18.25
Iron car axles.....	20.00 to 20.50
Steel car axles.....	14.50 to 15.00
No. 1 railroad wrought.....	9.50 to 10.00
No. 2 railroad wrought.....	10.00 to 10.50
No. 1 busheling.....	8.50 to 9.00
No. 2 busheling.....	4.50 to 5.00
Locomotive tires, smooth.....	12.50 to 13.00
Pipes and flues.....	7.00 to 7.50
Cupola Grades:	
No. 1 machinery cast.....	13.50 to 14.00
No. 1 railroad cast.....	12.50 to 13.00
No. 1 agricultural cast.....	12.50 to 13.00
Stove plate.....	11.75 to 12.25
Grate bars.....	10.75 to 11.25
Brake shoes.....	10.00 to 10.50
*Relaying rails, including angle bars to match, are quoted f.o.b. dealers' yards.	

Warehouse Prices, f.o.b. Chicago

Base per Lb.	
Plates and structural shapes.....	3.10c.
Soft steel bars.....	3.00c.
Reinforcing bars, billet steel.....	2.20c. to 2.65c.
Cold-finished steel bars and shafting—	
Rounds and hexagons.....	3.60c.
Flats and squares.....	4.10c.
Bands.....	3.65c.
Hoops.....	4.15c.
Black sheets (No. 24).....	3.95c.
Galvanized sheets (No. 24).....	4.80c.
Blue annealed sheets (No. 10).....	3.50c.
Spikes, standard railroad.....	3.55c.
Track bolts.....	4.55c.
Rivets, structural.....	3.60c.
Rivets, boiler.....	3.60c.
Per Cent Off List	
Machine bolts.....	60
Carriage bolts.....	60
Coach or lag screws.....	60
Hot-pressed nuts, squares, tapped or blank.....	60
Hot-pressed nuts, hexagons, tapped or blank.....	60
No. 8 black annealed wire, per 100 lb.....	\$3.20
Common wire nails, base per keg.....	\$2.85 to 2.95
Cement coated nails, base per keg.....	2.95

The McCutcheon mills of the Carnegie Steel Co., closely adjoining the disastrous gas tank explosion on the lower North Side of Pittsburgh, Monday morning, suffered damage through the removal of roofs, the wholesale breakage of glass and some internal, though not serious injuries to equipment. Fortunately there was no loss of life, as the mills were not active at the moment, although until Saturday, the plan had been to start up again on Monday morning. Instead the decision was made on Saturday to start Tuesday afternoon.

The New York Rapid Transit Corporation has placed with the Bethlehem Steel Co. a second order for Sandberg sorbitic steel rails, 50 tons of 100-lb. ARA-B section.

New York

Some Mills Follow Carnegie Advance On Plates, Shapes and Bars

NEW YORK, Nov. 15.—The pig iron market has been dull in the past week, total sales amounting to less than in the week preceding. The Burnham Boiler Corporation bought 500 tons for its plant at Irvington, N. Y., and the Crane Co. bought a like amount for Bridgeport, Conn., but other sales were of small lots, most for filling in foundry requirements to Jan. 1. The lack of interest in first quarter iron may perhaps be attributed to the belief generally held by consumers that no upward change in prices is imminent. Buffalo iron is being held a little more firmly at \$17, furnace, for No. 2 plain and No. 2X, but one maker is still reported to be quoting under that figure. Its minimum of \$16, however, is said to have been withdrawn, and \$16.50 is now the lowest it will go. Eastern Pennsylvania iron remains at \$19, furnace, for No. 2 plain and at \$19.50 for No. 2X, but one or two furnaces are trying to get a \$20 base on small lots. Considerable iron for first quarter is still to be purchased, but the present small volume of inquiry does not indicate how soon an expansion in demand may be expected. Some of the largest buyers have carefully measured their requirements up to Jan. 1, and are not yet contracting for anything that will be needed after that date. Shipments are going out at a fairly steady rate, and there are frequent requests for hurry-up carloads.

Prices per gross ton, delivered New York district:

Buffalo No. 2 fdy., sil. 1.75 to 2.25 (all rail).....	\$21.41 to \$21.91
No. 2 plain fdy. (by barge, del'd alongside in lighterage limits N. Y. and Brooklyn).....	19.00 to 20.00
East. Pa. No. 2 fdy., sil. 1.75 to 2.25	20.39 to 21.52
East. Pa. No. 2 fdy., sil. 2.25 to 2.75	20.89 to 22.02
East. Pa. No. 1X fdy., sil. 2.75 to 3.25	21.39 to 22.52

Freight rates: \$4.91 from Buffalo, \$1.39 to \$2.52 from eastern Pennsylvania.

Ferroalloys.—While there is some inquiry for ferromanganese for next year's delivery, no prices are being quoted by any producers so far as can be learned. New business is confined to carload and small lot sales and inquiries for this year's delivery. The same is true of spiegeleisen. Specifications on contract for all ferroalloys are reported good.

Cast Iron Pipe.—With a fair tonnage of pipe booked and a considerable volume of new business in prospect, makers of cast iron pressure pipe are adopting a firmer attitude. While \$27 per ton, base, Birmingham, is quoted on occasion, there is a decided effort on the part of makers to obtain \$28, and on contracts for delivery next year sellers are in many cases quoting advances of \$2 for each quarter. Among the large contracts pending are 1600 tons of 4-in., 6-in. and 8-in. water pipe for Bethlehem Township, N. Y., and 8000 tons of 4, 6, 8, 10, 12 and 20-in. water and gas pipe for Elizabeth, N. J. An inquiry from the United Gas Improvement Co., Philadelphia, calls for about 1800 tons of 4, 6, 8 and 12-in. gas pipe for delivery into November, 1928. Municipal purchasing of gas and water pipe is light and not much activity is expected until after the first of the year.

Prices per net ton, delivered New York: Water pipe 6-in. and larger, \$36.25 to \$37.25; 4-in. and 5-in., \$41.25 to \$42.25; 3-in., \$51.25 to \$52.25; Class A and gas pipe, \$4 to \$5 extra.

Reinforcing Bars.—Little business of importance has been reported placed in the last week, and several of the large pending jobs continue to hold the interest of the market. A manufacturing building in Brooklyn will require 400 tons and foundation work for a railroad bridge across Newark Bay will take 300 tons. Distributors in this territory are quoting 2.80c. per lb. for lots of five tons or more, delivered at job out of New York warehouse; on lots of two to five tons the price is 2.95c., and for less than two tons, 3.24c. The quoted mill price is unchanged at 1.85c., Pittsburgh,

and the Youngstown warehouse price is unchanged at 2.20c., or 2.57½c., on cars at New York.

Finished Steel.—Interest in the finished steel market centers in the results which may follow the announcement by the Carnegie Steel Co. of an advance on plates, shapes and bars to 1.80c., Pittsburgh, for the larger lots and to 1.90c., Pittsburgh, for small lots. Some of the independent mills have notified local sales offices that they will follow the Carnegie lead, while others are expecting such advices some day this week. An interesting feature of the situation is that the largest buyers may not enjoy the concessions which they have recently been favored with. In the case of bars, for example, 1.75c., Pittsburgh, is declared to

Warehouse Prices, f.o.b. New York

	Base per Lb.
Plates and structural shapes.....	3.34c.
Soft steel bars and small shapes.....	3.24c.
Iron bars	3.24c.
Iron bars, Swedish charcoal.....	7.00c. to 7.25c.
Cold-finished shafting and screw stock—	
Rounds and hexagons.....	3.30c.
Flats and squares.....	3.80c.
Cold-rolled strip, soft and quarter hard,	
6.00c. to 6.25c.	
Hoops	4.49c.
Bands	3.99c.
Blue annealed sheets (No. 10 gage).....	3.84c. to 3.89c.
Long terne sheets (No. 24 gage).....	5.80c.
Standard tool steel.....	12.00c.
Wire, black annealed.....	4.50c.
Wire, galvanized annealed.....	5.15c.
Tire steel, 1½ x ½ in. and larger.....	3.30c.
Smooth finish, 1 to 2½ x ¼ in. and larger	3.65c.
Open-hearth spring steel, bases.....	4.50c. to 7.00c.
Machine bolts, cut thread: Per Cent Off List	
¾ x 6 in. and smaller.....	55 to 60
1 x 30 in. and smaller.....	50 to 50 and 10
Carriage bolts, cut thread:	
½ x 6 in. and smaller.....	55 to 60
¾ x 20 in. and smaller.....	50 to 50 and 10
Coach screws:	
½ x 6 in. and smaller.....	55 to 60
1 x 16 in. and smaller.....	50 to 50 and 10
Boiler Tubes— Per 100 Ft.	
Lap welded steel, 2-in.....	\$17.33
Seamless steel, 2-in.....	20.24
Charcoal iron, 2-in.....	25.00
Charcoal iron, 4-in.....	67.00

Discounts on Welded Pipe

Standard Steel—	Black	Galv.
½-in. butt.....	46	29
¾-in. butt.....	51	37
1 to 3-in. butt.....	53	39
2½-6-in. lap	48	35
7 and 8-in. lap.....	44	17
11 and 12-in. lap.....	37	12

Wrought Iron—

½-in. butt.....	5	+19
¾-in. butt.....	11	+9
1-1½-in. butt.....	14	+6
2-in. lap	5	+14
3-6-in. lap.....	11	+6
7-12-in. lap.....	3	+16

Tin Plate (14 x 20 in.)

	Prime	Seconds
Coke, 100 lb. base box.....	\$6.45	\$6.20
Charcoal, per box—	A	AAA
IC	\$9.70	\$12.10
IX	12.00	14.25
IXX	13.90	16.00

Terne Plate (14 x 20 in.)

IC—20-lb. coating.....	\$10.00 to \$11.00
IC—30-lb. coating.....	12.00 to 13.00
IC—40-lb. coating.....	13.75 to 14.25

Sheets, Box Annealed—Black, C. R. One Pass

	Per Lb.
Nos. 18 to 20.....	3.90c. to 4.00c.
No. 22	4.05c. to 4.15c.
No. 24	4.10c. to 4.20c.
No. 26	4.20c. to 4.30c.
No. 28*	4.35c. to 4.45c.
No. 30	4.60c. to 4.70c.

Sheets, Galvanized

	Per Lb.
No. 14	4.35c.
No. 16	4.45c.
No. 18	4.50c. to 4.60c.
No. 20	4.65c. to 4.75c.
No. 22	4.70c. to 4.80c.
No. 24	4.85c. to 4.95c.
No. 26	5.10c. to 5.20c.
No. 28*	5.35c. to 5.45c.
No. 30	5.75c. to 5.85c.

*No. 28 and lighter, 36 in. wide, 20c. higher per 100 lb.

be the minimum available to distributors who had expected to be able to continue buying at 1.70c. Back of the upward movement in prices is said to be a determination on the part of some of the larger producers to discontinue the selling of steel to anybody at a loss. To most buyers the real effect of the advance will not come until contracts are made for first quarter, as most of them have covered their requirements to the end of the year at the prices which have been prevailing. In line with the movement in plates, shapes and bars, sheet mills are trying to bring about a better price situation, and although weakness is still quite marked, progress toward stability has been made during the week. Black sheets are generally quoted at 2.75c., and this is said to be the minimum on ordinary quality, but 2.70c. has been given on pickled stock carrying full extras. The market on blue annealed was tested by a buyer who had 200 tons to place, and who shopped diligently for a 2c. quotation, finally giving the business to an Ohio mill at 2.10c., Pittsburgh. If concessions on blue annealed are to be had, they are on narrow sizes, heavy gage, and the lowest reported in this market is 2.05c. Galvanized sheets remain at 3.65., Pittsburgh. Weakness continues on hot and cold rolled strips and wire products. On hot rolled strip, pickled and oiled, carrying full extras, 1.90c., Pittsburgh, is available, but on ordinary black stock the minimum appears to be 2.10c. for the wider gages. On the larger lots of cold rolled strip 2.75c., net, Pittsburgh, has been quoted. This is equal to 3c., base. Wire nails are freely available at \$2.50 per 100 lb. keg, with some buyers offering \$2.45, while plain wire is being sold at 2.35c. and 2.40c., depending on the quantity. Following its recent large purchase of rails, the New York Central will soon come in the market for 20,000 to 25,000 tons of tie plates.

Mill prices per lb., delivered New York: Soft steel bars, 2.09c. to 2.14c.; plates, 2.09c. to 2.14c.; structural shapes, 2.09c. to 2.14c.; bar iron, 2.09c. to 2.14c.

Warehouse Business.—Demand is not on as large a scale as in October, but purchasing from stock is reported to be regular and evenly distributed among all products. Sheets continue to show a weak tendency, black ranging from 4.10c. to 4.20c. per lb., base, and galvanized from 4.85c. to 4.95c. per lb., base. Occasionally desirable lots will bring out even lower quotations, but sellers are endeavoring to maintain the market.

Old Material.—Prices of all grades of scrap are substantially unchanged with the exception of machine shop turnings, which are showing slightly more strength than a week ago. Although \$10 per ton, delivered, is the buying price of most dealers, one broker is offering \$10.50 per ton, delivered to a Phoenixville, Pa., consumer. Mixed borings and turnings are unchanged at \$9.50 per ton, delivered Swedeland, Pa., and \$10 per ton is being paid for other eastern Pennsylvania delivery. No. 1 heavy melting steel is being purchased at \$13.50 per ton, delivered. For cast iron borings dealers are offering \$10.50 per ton for delivery to a Harrisburg user and \$10.75, delivered Pencoed, Pa.

Dealers' buying prices per gross ton, New York:

No. 1 heavy melting steel.....	\$10.00 to \$10.85
Heavy melting steel (yard).....	6.50 to 6.75
No. 1 heavy breakable cast.....	11.25 to 12.00
Stove plate (steel works).....	8.25 to 8.75
Locomotive grate bars.....	8.50 to 8.75
Machine shop turnings.....	6.00 to 7.00
Short shoveling turnings.....	6.50 to 7.50
Cast borings (blast furnace or steel works).....	6.75 to 7.25
Mixed borings and turnings.....	6.00 to 7.50
Steel car axles.....	15.75 to 16.25
Iron car axles.....	23.25 to 23.75
Iron and steel pipe (1 in. diam., not under 2 ft. long).....	8.75
Forge fire.....	6.50 to 7.00
No. 1 railroad wrought.....	10.50 to 11.00
No. 1 yard wrought, long.....	9.00 to 9.50
Rails for rolling.....	10.00 to 10.50
Cast iron carwheels.....	11.25 to 11.75
Stove plate (foundry).....	9.00 to 9.50
Malleable cast (railroad).....	10.00 to 10.50
Cast borings (chemical).....	11.50 to 12.00

Prices per gross ton, delivered local foundries:

No. 1 machinery cast.....	\$14.00 to \$14.50
No. 1 heavy cast (columns, building materials, etc.), cupola size	12.50 to 13.00
No. 2 cast (radiators, cast boilers, etc.).....	11.50 to 12.00

Cleveland

Steel Trade More Cheerful Following Advances on Plates, Shapes and Bars

CLEVELAND, Nov. 15.—Independent mills have followed the Carnegie Steel Co. in advancing steel bars, plates and structural material \$1 a ton to 1.80c., Pittsburgh, in this territory, and a local mill has advanced steel bars to 1.80c., Cleveland. With this advance mills have again adopted quantity differentials, naming 1.90c. for less than car lots.

Previous to the advance quite a few consumers placed contracts for the remainder of the year at 1.75c., and some of the mills that did not make contracts gave their customers an opportunity to enter current orders at the same price. Consequently the advance will not apply to much tonnage to be booked during the remainder of the year. Some buyers endeavored to place orders at 1.75c. for delivery that would extend into or through the first quarter, but mills declined to take business at that price for shipment beyond December. Some buyers are now asking mills to allow them the 1.75c. price on specific work on which they figured before the advance.

While the new prices have not yet been tested, the attitude of the mills indicates that they will be maintained. The advance has created a more optimistic feeling in the steel trade and has brought out quite a little business, which indicates that consumers will carry more steel in stock, although consuming industries must get busier to bring out an increase in steel consumption.

In the structural field the outstanding award during the week was 18,000 tons by the Cleveland Union Terminals Co. for a bridge.

Conditions in the automotive industry show little change. The slackening in automobile production is still confined largely to makers of cheaper cars. The Ford Motor Co. is understood to have purchased a fair tonnage of alloy spring steel, but other orders from the Ford company are still for small lots.

Semi-Finished Steel.—A slight improvement is reported in specifications for billets. Sheet bar orders are fairly numerous but are only for small lots. While the open quotation on sheet bars is unchanged at \$34, Cleveland, some business has been taken at \$1 a ton concession.

Pig Iron.—The market shows more life, due largely to the fact that some consumers are beginning to show an interest in first quarter contracts. Some producers are now soliciting business for that delivery. Sales by Cleveland interests during the week aggregated 15,000 tons, the greater part of which was in small orders to fill in November and December. The remainder was for the first quarter. Lake furnace iron can still be bought at \$16.50 for foundry and malleable grades for early shipment, but furnaces going that low appear to be holding to \$17 for the first quarter. Others quoting a \$17 minimum on current orders are naming the same price for the next quarter. The local furnace price for Cleveland delivery remains at \$18, at which a few small-lot sales were made during the week. For Michigan delivery the market is steady at \$18, furnace. Quite a few inquiries for the first quarter are pending and some producers look for the development of a moderate buying movement for that delivery shortly. However, many consumers have held back shipments to an

Warehouse Prices, f.o.b. Cleveland

	Base per Lb.
Plates and structural shapes.....	3.00c.
Soft steel bars.....	3.00c.
Reinforcing steel bars.....	2.25c. to 2.75c.
Cold-finished rounds and hexagons.....	3.65c.
Cold-finished flats and squares.....	4.15c.
Hoops and bands.....	3.65c.
Cold-finished strip.....	*5.95c.
Black sheets (No. 24).....	3.75c.
Galvanized sheets (No. 24).....	4.40c. to 4.50c.
Blue annealed sheets (No. 10).....	3.25c.
No. 9 annealed wire, per 100 lb.....	\$2.90
No. 9 galvanized wire, per 100 lb.....	3.35
Common wire nails, base per keg.....	2.90

*Net base, including boxing and cutting to length.

extent that they will carry over considerable iron into the next quarter. Shipping orders are running about the same as in October. Business is light with jobbing foundries and reports do not indicate any increase in melt by other consumers.

Prices per gross ton at Cleveland:

N'th'n No. 2 fdy., sil. 1.75 to 2.25.....	\$18.50
Southern fdy., sil. 1.75 to 2.25.....	22.00
Malleable	18.50
Ohio silvery, 8 per cent.....	30.00
Basic, Valley furnace.....	17.00
Standard low phos., Valley furnace.....	27.00

Prices, except on basic and low phosphorus, are delivered Cleveland. Freight rates: 50c. from local furnaces; \$3 from Jackson, Ohio; \$6 from Birmingham.

Iron Ore.—The ore balance on Lake Erie docks Nov. 1 was 7,211,474 tons, as compared with 7,596,568 tons on the same date a year ago. Receipts at Lake Erie docks during October amounted to 4,929,088 tons and for the season until Nov. 1, 34,720,454 tons, as compared with 38,888,429 tons during the same period last year. Shipments from these docks during October were 3,199,885 tons and for the season until Oct. 1, 24,755,962 tons, as compared with 27,935,327 tons during the same period last year. Receipts until Nov. 1 at the Lake Michigan ports of Indiana Harbor, Gary and South Chicago were 11,356,419 tons.

Coke.—Foundry coke is moving very slowly, and prices on Connellsville grades are unchanged at from \$3.75 up to \$5.35, the latter being for premium brands. One producer marked foundry heating coke down during the week to \$2.50 and after taking considerable business advanced its price to \$2.65. By-product furnace coke for domestic use is inactive. Dealers are well stocked and are not expected to come into the market until they reduce their stocks. Quotations range from \$4.75 to \$5 on egg sizes.

Bolts, Nuts and Rivets.—Orders for bolts and nuts continue light. There is no improvement in the demand from the automotive industry. The demand for rivets is also dull. As practically all consumers of large rivets have contracts at \$2.75 per 100 lb., little business is being taken at the \$3 price, which is being quoted for current orders. Small rivets are holding to 70 and 10 per cent off list, Cleveland, for the small orders that are being taken.

Sheets.—The demand for sheets continues rather slow and orders are mostly for small lots. Prices are no weaker than they have been, but there is little evidence of any stronger price situation, although several of the mills will not meet the low quotations that are appearing. Sales of black sheets to barrel manufacturers are reported at 2.75c., Ohio mill, but for other consumers 2.75c., Pittsburgh, appears to be the minimum and 2.80c., Pittsburgh, the more common quotation. On blue annealed sheets 2c., Pittsburgh, is reported rather common in Detroit, but in this market 2.10c. is the more general price. On galvanized sheets 3.65c., Pittsburgh, is generally quoted, although the same price is being quoted Ohio mill basis. Automobile body sheets are rather steady at 4.15c., Pittsburgh.

Strip Steel.—Hot rolled strip steel continues irregular, particularly in the wide material and heavier gages, which must meet the competition of plate mills and which has sold in good lots at 1.75c., Pittsburgh, and is quoted at 1.90c. car lots. On cold rolled strip 3c., base, Cleveland, or 2.75c. for three tons or over is fairly common. Fender stock has been reduced \$4 a ton to 4.30c. for Nos. 17 to 21 gage. This cut follows a \$5 a ton reduction made on this material last month. Business in both hot and cold rolled strip continues rather light.

Reinforcing Bars.—Small lots are in fair demand but there is little inquiry for good tonnages. Cleveland Union Terminal work requiring 700 tons is pending. Rail steel bars range from 2.60c. to 2.70c., mill, not yet having followed the advance on billet steel bars.

Warehouse Business.—Jobbers continue to take a fair volume of small-lot orders. Prices are well maintained except in some of the outlying sections where there is considerable competition from Pittsburgh jobbers.

Old Material.—A Cleveland mill has purchased 12,-

000 tons of heavy melting steel for future delivery at \$14 for No. 1 and \$13.50 for No. 2. As this consumer still has some scrap due on contracts, it is not expected to issue releases against the new orders before February. It has been holding up shipments for some time, but during the week issued some releases for steel-making grades. As a result of this purchase the dealers' price in Cleveland is no longer quotable above \$13.50 for heavy melting steel, but it is doubtful if material could be bought for less. Aside from the activity noted above, the market is lifeless. Some of the mills in the Valley district are still holding up shipments. The market has a weak tone and quotations on most grades are nominal. While scrap shipments have been either cut down or suspended by some of the mills, the scrap produced is apparently all being absorbed, due to the fact that the production has been curtailed considerably, particularly by the automotive industry.

Prices per gross ton, delivered consumers' yards:

Basic Open-Hearth Grades	
No. 1 heavy melting steel.....	\$13.50
No. 2 heavy melting steel.....	13.00
Compressed sheet steel.....	\$12.50 to 12.75
Light bundled sheet stampings.....	11.00 to 11.50
Drop forge flashings.....	12.00 to 12.50
Machine shop turnings.....	9.00 to 9.25
No. 1 railroad wrought.....	11.50 to 12.00
No. 2 railroad wrought.....	13.50 to 13.75
No. 1 busheling.....	11.50 to 11.75
Pipes and flues.....	9.00 to 9.50
Steel axle turnings.....	12.50 to 13.00
Acid Open-Hearth Grades	
Low phosphorus forging crops.....	16.50 to 17.00
Low phosphorus, billet, bloom and slab crops.....	17.00 to 17.50
Low phosphorus sheet bar crops.....	16.50 to 17.00
Low phosphorus plate scrap.....	16.00 to 16.50
Blast Furnace Grades	
Cast iron borings.....	10.50 to 10.75
Mixed borings and short turnings.....	10.50 to 10.75
No. 2 busheling.....	10.50 to 10.75
Cupola Grades	
No. 1 cast.....	16.00 to 16.50
Railroad grate bars.....	11.00 to 12.00
Stove plate.....	12.00 to 12.50
Rails under 3 ft.....	18.00 to 18.50
Miscellaneous	
Railroad malleable.....	15.50 to 16.00
Rails for rolling.....	16.25 to 16.50

Philadelphia

Plate, Shape and Bar Consumers Covered To End of Year

PHILADELPHIA, Nov. 15.—The advance of \$1 a ton on plates, shapes and bars by the leading interest has been followed rather generally by eastern Pennsylvania mills. One producer of plates has not yet advanced to the new basis and an eastern Pennsylvania shape mill, unable to enter into contracts, is still quoting on the former basis for shapes. As the advance brought out a good volume of contracting for delivery to the end of the year at the former price of 1.75c. per lb., Pittsburgh, no test of the new price is expected until buying for first quarter develops. While some of the tonnages under contract for delivery this year will probably be sufficient to carry the consumers over into next year

Warehouse Prices, f.o.b. Philadelphia

	Base per Lb.
Plates, ¼-in. and heavier.....	2.50c. to 2.60c.
Plates, ⅜-in.	2.80c. to 3.00c.
Structural shapes	2.50c. to 2.60c.
Soft steel bars, small shapes and iron bars (except bands).....	2.50c. to 2.60c.
Round-edge iron	3.50c.
Round-edge steel, iron finished, 1½ x 1½ in.	3.50c.
Round-edge steel, planished.....	4.80c.
Reinforcing steel bars, square, twisted and deformed.....	2.50c. to 3.00c.
Cold-finished steel, rounds and hexagons	3.25c. to 5.25c.
Cold-finished steel squares and flats	3.75c. to 5.75c.
Steel hoops	3.85c. to 4.15c.
Steel bands, No. 12 gage to ⅝-in., inclusive	3.60c. to 3.90c.
Spring steel	5.00c.
Black sheets (No. 24).....	4.25c. to 4.35c.
Galvanized sheets (No. 24).....	5.10c. to 5.20c.
Blue annealed sheets (No. 10)....	3.20c. to 3.30c.
Diamond pattern floor plates—	
¼-in.	5.30c.
⅜-in.	5.50c.
Rails.....	3.20c.
Swedish iron bars.....	6.60c.

at their present rate of operation, in some instances sellers are insisting upon complete specification before the end of this year.

Pig Iron.—Sales of foundry are almost exclusively for delivery over the rest of this year at \$19 to \$19.50 per ton, furnace, and the occasional small contracts that are placed for delivery in the first quarter show no advance from these prices. A recent sale of about 2000 tons of basic is reported to have been at \$19.50, delivered. Low phosphorus is quiet and prices unchanged. In the past week about 200 tons of British low-phosphorus has been closed at \$23.50 per ton, c.i.f., duty paid.

Prices per gross ton at Philadelphia:

East. Pa. No. 2 plain, 1.75 to 2.25 sil.	\$19.76 to \$20.26
East. Pa. No. 2X, 2.25 to 2.75 sil.	20.26 to 20.76
East. Pa. No. 1X, 2.25 to 2.75 sil.	20.76 to 21.26
Basic (delivered eastern Pa.)	19.50 to 20.00
Gray forge	19.50 to 20.00
Malleable	21.00 to 21.50
Standard low phos. (f.o.b. New York State furnace)	23.00 to 24.00
Copper bearing low phos. (f.o.b. furnace)	23.50 to 24.00
Virginia No. 2 plain, 1.75 to 2.25 sil.	25.29 to 25.54
Virginia No. 2X, 2.25 to 2.75 sil.	25.79 to 26.04

Prices, except as specified otherwise, are delivered Philadelphia. Freight rates: 76c. to \$1.64 from eastern Pennsylvania furnaces; \$4.54 from Virginia furnaces.

Billets.—Purchasing is still on a basis of covering requirements for contracts on consumers' books. Prices are unchanged at \$33 to \$34 per ton, Pittsburgh, for rerolling billets and \$38 to \$39 per ton for forging quality.

Bars.—One producer reports the heaviest week of contracts for bars of any this year. The advance to 1.80c. per lb., base, Pittsburgh, has brought out a fair volume of contracts for delivery to the end of the year at 1.75c. per lb., Pittsburgh, so that makers are awaiting the actual test of the market that will probably develop later when first quarter purchasing appears.

Shapes.—Although most mills have advanced to a basis of 1.80c. per lb., base, Pittsburgh, the fact that one producer is unable to enter into contracts with its customers leaves the 1.75c. per lb. basis still open. Just prior to the report of an advance in prices some business is understood to have been taken in eastern Pennsylvania at about 1.70c. per lb., base. An additional factor contributing to softness is the protection at less than 1.75c. per lb., base, which some consumers have until the end of this month and in some cases into December. The current market is quotable at 1.75c. to 1.80c. per lb., base, Pittsburgh.

Plates.—After having covered their customers' requirements to the end of the year at 1.75c. per lb., base, most mills have advanced to 1.80c. per lb. on new business. One eastern Pennsylvania producer is still on the former basis, so that the market ranges from 1.75c. to 1.80c. per lb., base, Pittsburgh.

Sheets.—Black sheets are quoted at 2.80c. to 2.85c. per lb., base, Pittsburgh, but occasional concessions to 2.75c. per lb., base, are reported. Galvanized sheets range from 3.65c. to 3.75c. per lb., base, Pittsburgh. Blue annealed are quoted at 2.10c. per lb., base, but slightly less than this is offered on occasion when competition of strip steel sheets is encountered.

Ferromanganese.—No price for first half has been established and consumers seem to be satisfied to cover their immediate requirements with purchases of small lots for prompt shipment at \$90 per ton, seaboard or domestic furnace.

Warehouse Business.—Competition is severe and prices are soft and irregular. Plates, shapes and bars range from 2.50c. to 2.60c. per lb., base, with slightly less than 2.50c. per lb. occasionally quoted on desirable business. Sheet prices are unstable, with concessions rather freely offered.

Imports.—In the week ended Nov. 12 the only importation was nine tons of structural shapes from Germany.

Old Material.—A tendency toward weakness is still evident on most grades. Machine shop turnings are an exception, showing an advance of 50c. to \$11 per ton, based on a recent purchase of about 6000 tons by an eastern Pennsylvania consumer, which had been offer-

ing \$10 per ton, delivered, but was unable to obtain a tonnage at this price. Other grades continue quiet.

Prices per gross ton delivered consumers' yards, Philadelphia district:

No. 1 heavy melting steel	\$14.00
Scrap T rails	\$13.00 to 13.50
No. 2 heavy melting steel	11.00 to 11.50
No. 1 railroad wrought	15.25 to 15.75
Bundled sheets (for steel works)	10.50
Machine shop turnings (for steel works)	10.50 to 11.00
Heavy axle turnings (or equivalent)	12.00 to 12.50
Cast borings (for steel works and rolling mill)	11.25
Heavy breakable cast (for steel works)	15.50 to 16.00
Railroad grate bars	12.50
Stove plate (for steel works)	12.50
No. 1 low phos., heavy, 0.04 per cent and under	18.00 to 18.50
Couplers and knuckles	16.00
Rolled steel wheels	15.50 to 16.00
No. 1 blast furnace scrap	10.00 to 10.50
Machine shop turnings (for rolling mill)	11.00 to 11.50
Wrought iron and soft steel pipes and tubes (new specifications)	12.00 to 12.50
Shafting	17.50 to 18.00
Steel axles	19.00 to 20.00
No. 1 forge fire	11.00
Steel rails for rolling	15.00 to 15.50
Cast iron carwheels	15.50 to 16.00
No. 1 cast	16.00 to 16.50
Cast borings (for chemical plant)	15.00 to 15.50

Steel Club Elects Officers

At the recent meeting of the Steel Club of Philadelphia, the following officers were elected for the coming year: President, J. B. De Wolf, Trumbull Steel Co.; vice-president, W. S. Haring, Alan Wood Iron & Steel Co.; directors, L. M. Schrufer, Lorain Steel Co., P. M. King, Worth Steel Co.; secretary and treasurer, F. J. Krouse, Bethlehem Steel Co., reelected.

New England Industrial Notes

Landers, Frary & Clark, New Britain, Conn., are operating on a full time basis.

September sales of the Sullivan Machinery Co., Claremont, N. H., were somewhat in excess of those for the corresponding month last year. Unfilled orders as of Sept. 30 were 51 per cent greater than on that date last year.

The Standard Sales & Service Co., Woodford Avenue, Plainville, Conn., a subsidiary of the Standard Steel & Bearing Co., is now known as the M. R. C. Bearing Service Co., and will be located at Jamestown, N. Y.

The Barstow Stove Co., Providence, R. I., established in 1836, proposes to abandon its foundry and to use the space for assembling gas ranges. Castings still required for stove manufacture will be purchased from the Builders' Iron Foundry. J. P. Barstow is president.

Remington Rand, Inc., recently obtained a large contract from the General Motors Corporation for office supplies and equipment, which will run to \$500,000 the first year and to larger amounts in subsequent years. The company has similar contracts with many of the other leading industries.

Franco-American Tariff Negotiations

WASHINGTON, Nov. 15.—Approval has been given by the French cabinet to a temporary Franco-American tariff arrangement and a new schedule of duties on American imports will be made public soon. Minister of Commerce Bokanowski has announced that the "negotiations have been very happily concluded." The new schedule is reported to reinstate the rates formerly given the United States and other countries as well, except where there is a higher minimum applying in the Franco-German treaty, which will also be applied to American people.

The American Manganese Producers' Association, recently organized for the purpose of increasing production of manganese ores in the United States, has just opened general offices in Washington. The organization, as an aid in national preparedness, is undertaking to relieve the dependency of America on foreign sources of supply.

Birmingham

Pig Iron Sales Increase—Plates, Shapes and Bars Up \$1

BIRMINGHAM, Nov. 15.—Pig iron sales are now extending to December deliveries and a comfortable tonnage has been booked by Alabama furnaces within the past 10 days for the remainder of the year. For about a week following the cut to a \$16 base, many consumers continued to buy for early requirements or confined their commitments to November. There has since been a more liberal attitude and tonnage is coming in at a fair rate for delivery up to Jan. 1. The outlook is better than at any previous time since early spring and the furnaces now have orders further in advance. One company has sold for November about 9000 tons more than its probable make. Furnace operations have not changed, 18 being in blast, nine on foundry iron. The Woodward Iron Co. is alternating one of its furnaces on basic and foundry. Not since March, 1922, has Alabama had as few as 18 furnaces in blast. The price of pig iron is also the lowest since that month.

Prices per gross ton, f.o.b. Birmingham district furnaces:

No. 2 foundry, 1.75 to 2.25 sil.....	\$16.00
No. 1 foundry, 2.25 to 2.75 sil.....	16.50
Basic	16.00

Finished Steel.—Price advances of \$1 a ton on plates, shapes and bars have been made, in line with those of other districts. Demand and inquiries continue gradually to improve. The accumulation of tonnage by manufacturers and fabricators continues to grow and all plants are operating at a high rate. The Tennessee Coal, Iron & Railroad Co. has received an order from the Frisco Lines for about 35,000 tons of rail. The largest structural steel award of the week was for the new 16-story office building to be erected in Birmingham by the Watts estate, amounting to 850 tons, which was awarded to the Virginia Bridge & Iron Co. Open-hearth steel operations are the same as for last week, the Tennessee company averaging 12 and the Gulf States Steel Co. five. It is expected that one of the Gulf States open-hearth furnaces will be closed down next week.

Cast Iron Pipe.—The McWane Cast Iron Pipe Co., Birmingham, and the Pacific States Cast Iron Pipe Co., Provo, Utah, will furnish the city of Los Angeles with about 3500 tons of 6-in. pipe during the next six months. Shipments will be started shortly. The American Cast Iron Pipe Co. and the National Cast Iron Pipe Co. have been awarded about 2500 tons of 12-in. centrifugal pipe by the city of Detroit. Birmingham plants also shared in the award of 88,000 ft. of 6-in. and 75,000 ft. of 8-in. pipe by St. Clair Shores, Mich. A number of small orders, amounting to several hundred tons each, have been obtained. The pipe situation is somewhat improved, and the base price is firmer around \$28. Inquiries are developing for tonnage that will be placed during the first quarter of next year.

Coke.—Foundry coke has declined 50c. a ton, \$5 now being asked on contract and \$5.50 for spot. Demand remains slow. Continued warm weather has adversely affected domestic coke movement.

Warehouse Prices, f.o.b. St. Louis

	Base per Lb.
Plates and structural shapes.....	3.25c.
Bars, soft steel or iron.....	3.15c.
Cold-finished rounds, shafting and screw stock	3.75c.
Black sheets (No. 24).....	4.80c.
Galvanized sheets (No. 24).....	5.35c.
Blue annealed sheets (No. 10).....	3.60c.
Black corrugated sheets	4.65c.
Galvanized corrugated sheets	5.30c.
Structural rivets	3.60c.
Boiler rivets	3.80c.
	Per Cent Off List
Tank rivets, 7/8-in. and smaller.....	70
Machine bolts	60
Carriage bolts	60
Lag screws	60
Hot-pressed nuts, square, blank or tapped... 60	
Hot-pressed nuts, hexagons, blank or tapped. 60	

Old Materials.—A slight increase in sales is reported. Inquiries are also more numerous. Prices are about the same as last week.

Prices per gross ton, delivered Birmingham district consumers' yards:

Heavy melting steel.....	\$10.00 to \$10.50
Scrap steel rails.....	11.00 to 11.50
Short shoveling turnings.....	8.00 to 8.50
Cast iron borings.....	8.00 to 8.50
Stove plate	13.00 to 14.00
Steel axles	19.00 to 20.00
Iron axles	18.00 to 20.00
No. 1 railroad wrought.....	10.00 to 11.00
Rails for rolling.....	12.00 to 13.00
No. 1 cast.....	14.50 to 15.00
Tramcar wheels	12.50 to 13.50
Cast iron carwheels.....	12.00 to 13.00
Cast iron borings, chemical.....	13.50 to 14.00

St. Louis

Wabash Buys 20,000 Tons of Rails—Additional Inquiry for 61,900 Tons

ST. LOUIS, Nov. 15.—Keener interest in pig iron is indicated by a substantial increase in sales by the Granite City maker during the last week, its business totaling 14,000 tons, including a lot of 5000 tons taken by a Missouri melter and several lots of 1000 tons. The remainder was in lots of a carload and upward. Shipments of the local maker during November show a gain over the same period last year, and specified deliveries call for liberal shipments during the remainder of this month and December. Following a few weeks of good business due to the price reduction, activity in Southern iron has almost ceased. Prices are unchanged.

Prices per gross ton at St. Louis:

No. 2 fdy., sil. 1.75 to 2.25 f.o.b.	
Granite City, Ill.....	\$19.50 to \$20.00
Northern No. 2 fdy., delivered	
St. Louis	20.66
Southern No. 2 fdy., delivered...	20.42
Northern malleable, delivered...	20.66
Northern basic, delivered.....	20.66

Freight rates: 81c. from Granite City to St. Louis; \$2.16 from Chicago; \$4.42 from Birmingham.

Coke.—Sales of domestic grades of coke have picked up considerably during a week of colder weather, the first wintry spell of the season. The movement of metallurgical grades is steady, but only in fair volume.

Rails.—Following the purchase last week of 35,000 tons of rails by the St. Louis-San Francisco Railroad, as noted, the Wabash has ordered 20,000 tons and three other roads are inquiring for a total of 61,900 tons, as follows: Missouri Pacific, 37,500 tons, weight 90 lb.; Texas & Pacific, 14,400 tons, weight 110 lb.; International-Great Northern Railway, 10,000 tons, weight 90 lb. The Missouri Pacific is also in the market for 3,000,000 tie plates (18,000 tons), and the International-Great Northern wants 1,250,000 tie plates (7500 tons). All of this material is expected to be purchased soon, and it is for delivery in the first half of 1928. The Wabash purchase was divided as follows: Illinois Steel Co., 9500 tons; Inland Steel Co., 7500 tons; Bethlehem Steel Co., 3000 tons.

Finished Iron and Steel.—The National Enameling & Stamping Co. has not advanced its price on plates, in line with the advance during the week of the Illinois Steel Co. and Inland Steel Co., which increased their quotations on plates, shapes and bars \$2 a ton on less than 100-ton lots and \$1 a ton on larger tonnages. The price of the local interest is for immediate acceptance. Greater interest is being shown in these items and in sheets for the first quarter of next year. Immediate business in sheets has shown some improvement in the last few weeks. Specifications against contracts for tin plate are quite liberal. Warehouse sales during the week showed improvement. Structural fabricators report business is extremely dull. Reinforcing bar contracts during the week totaled 1050 tons.

Old Material.—The purchase of a small tonnage of malleable scrap by gray iron foundries constituted the only activity of the week. Most of the consumers in the district have fairly good stocks of old material. Dealers are buying only when they have orders. Railroad lists were heavy this week, including: Southern Railway, 9000 tons; Chesapeake & Ohio, 8500 tons; Rock Island, 7500 tons; Wabash, 2400 tons; Missouri-Kansas-

Texas, 1500 tons; Nickel Plate, 1500 tons; St. Louis & San Francisco, 1000 tons; Chicago & Eastern Illinois, 1000 tons; Chicago Belt Railway, 800 tons; Monon Route, 650 tons; Pullman Co. (St. Louis), 600 tons, and Ann Arbor, 200 tons.

Prices per gross ton f.o.b. dealers' yards and delivered St. Louis district consumers' works:

Heavy melting steel.....	\$10.75 to \$11.00
No. 1 locomotive tires.....	13.00 to 13.50
Heavy shoveling steel.....	10.75 to 11.00
Miscellaneous standard-section rails, including frogs, switches and guards, cut apart.....	12.75 to 13.00
Railroad springs.....	12.75 to 13.00
Bundled sheets.....	8.00 to 8.50
No. 2 railroad wrought.....	10.75 to 11.00
No. 1 busheling.....	9.50 to 10.00
Cast iron borings.....	8.75 to 9.00
Iron rails.....	12.50 to 13.00
Rails for rolling.....	13.50 to 14.00
Machine shop turnings.....	6.00 to 6.50
Steel car axles.....	18.25 to 18.75
Iron car axles.....	22.50 to 23.00
Wrought iron bars and transoms.....	19.50 to 20.00
No. 1 railroad wrought.....	10.00 to 10.50
Steel rails, less than 3 ft.....	14.50 to 15.00
Steel angle bars.....	10.75 to 11.25
Cast iron carwheels.....	12.00 to 12.50
No. 1 machinery cast.....	14.50 to 15.00
Railroad malleable.....	11.00 to 11.50
No. 1 railroad cast.....	13.00 to 13.50
Agricultural malleable.....	11.50 to 12.00
Relaying rails, 60 lb. and under.....	20.50 to 23.50
Relaying rails, 70 lb. and over.....	26.50 to 29.00

Toronto

Canadian Furnaces Feel United States Pig Iron Competition

TORONTO, ONT., Nov. 15.—New business in pig iron is entirely of a spot nature. While the number of such orders continue at a good level, tonnages involved are below those of two or three weeks ago. Current sales range chiefly from one or two car lots, with an occasional order for as much as 200 tons. Canadian producers continue to complain of United States competition in this market. The softening tendency in some markets across the border is being felt here, although no further price reductions have as yet gone into effect in the local market.

Prices per gross ton:

Delivered Toronto	
No. 1 foundry, sil. 2.25 to 2.75.....	\$23.60
No. 2 foundry, sil. 1.75 to 2.25.....	23.60
Malleable.....	23.60
Delivered Montreal	
No. 1 foundry, sil. 2.25 to 2.75.....	25.50
No. 2 foundry, sil. 1.75 to 2.25.....	25.50
Malleable.....	25.50
Basic.....	24.50
Imported Iron at Montreal Warehouse	
Summerlee.....	33.50
Carron.....	33.00

Rails.—The Canadian National Railways have just placed orders with Canadian mills for 133 tons of steel rails, 91 tons of angle bars, 360 tons of spikes, 24 tons of bolts, 3018 tons of tie plates, 1½ tons of shim spikes, and 10,000 rail anchors for Canadian lines; also 89 gross tons of spikes for United States lines. The British Empire Steel Corporation, Dominion Iron & Steel section, Sydney, N. S., has just completed rolling an 8000-ton rail order for the Indian Government Railways, and is now making ready to roll a 10,000 to 20,000-ton rail order for the Canadian National Railways. The Dominion Iron & Steel Corporation is also reported to have just closed an order for 10,000 tons of tie plates for the Canadian National Railways, and has received rail orders from Jamaica, East India and Chile. The Algoma Steel Corporation, Sault Ste. Marie, Ont., is also completing arrangements to start up its rail mill, having closed a number of small orders in addition to the previously reported 50,000-ton rail order for the Canadian National Railways.

Old Material.—Following several weeks of fairly active buying, interest in this market has declined somewhat during the past few days. Large consumers are covered by contract up to the end of the year and from these there is a steady flow of release orders. In the Montreal district the demand on export account has dropped to less than half of that of a couple of months ago, and where dealers formerly had an outlet for their

surplus holdings in the United States, they now must look to the home demand for a market. Prices are weak in Toronto and Montreal districts, and while there has been no actual downward revision, there is little prospect for any immediate advance.

Dealers' buying prices:

Per Gross Ton	Toronto Montreal	
Heavy melting steel.....	\$9.50	\$8.00
Rails, scrap.....	10.00	10.00
No. 1 wrought.....	10.00	11.00
Machine shop turnings.....	7.00	6.00
Bolter plate.....	7.00	7.00
Heavy axle turnings.....	7.50	7.50
Cast borings.....	7.50	6.00
Steel turnings.....	7.00	6.50
Wrought pipe.....	5.00	6.00
Steel axles.....	14.00	19.00
Axles, wrought iron.....	16.00	21.00
No. 1 machinery cast.....	.....	16.00
Stove plate.....	.....	12.00
Standard carwheels.....	.....	14.50
Malleable.....	.....	13.00
Per Net Ton		
No. 1 machinery cast.....	15.00	.....
Stove plate.....	9.00	.....
Standard carwheels.....	13.00	.....
Malleable scrap.....	13.00	.....

Buffalo

Pig Iron Slightly Firmer at \$17—Steel Operations Improve

BUFFALO, Nov. 15.—The pig iron market is quiet, with no sizable lots out to test prices. Aggregate inquiry has been only a few hundred tons, principally car-load lots. Furnaces are holding to \$17 for No. 2 plain, 1.75 to 2.25 silicon, in the district and \$17.50 for malleable. One furnace which had been quoting \$16 on eastern shipment is understood to have withdrawn this concession, and is now quoting \$17 on New England business, the same as the other sellers.

Prices per gross ton, f.o.b. furnace:

No. 2 plain fdy., sil. 1.75 to 2.25.....	\$17.00
No. 2X foundry, sil. 2.25 to 2.75.....	17.50
No. 1X foundry, sil. 2.75 to 3.25.....	18.50
Malleable, sil. up to 2.25.....	17.50
Basic.....	17.00
Lake Superior charcoal.....	27.28

Finished Iron and Steel.—Specifications for most classes of material are a little better. Makers of sheets and pipe in particular notice the better feeling. On black sheets 2.80c. is being done and on galvanized 3.75c. Pipe specifications for both lapweld and butt weld are better. The reinforcing bar market is inactive except for the second part of the Huron Cement Co. mill job. Bins will require 300 to 400 tons of bars and a bagging house will require 100 tons. The contract for fabricating structural steel for the Lawrence Hotel, Erie, Pa., has been awarded to the McClintic-Marshall Co. It calls for 650 tons. Operation of mills is slightly better. The Bethlehem Steel Co. is operating 20 of its 24 open-hearth furnaces, while its new structural mill is on double time and most of the other mills are on double time the major portion of the week. New poultry netting and wire cloth prices are in effect, the latter being somewhat higher than the last schedule and netting about the same. Demand is good.

Old Material.—Another sale of heavy melting steel at \$14.50 to \$14.75 was made during the week, following a fairly large transaction reported last week. Prices are off slightly on the principal grades. Furnace operation on the whole is slightly better because decreases at some mills have been made up by increases

Warehouse Prices, f.o.b. Buffalo

	Base per Lb.
Plates and structural shapes.....	3.40c.
Soft steel bars.....	3.30c.
Reinforcing bars.....	2.75c.
Cold-finished flats, squares and hexagons.....	4.45c.
Rounds.....	3.95c.
Cold rolled strip steel.....	5.85c.
Black sheets (No. 24).....	4.30c.
Galvanized sheets (No. 24).....	5.15c.
Blue annealed sheets (No. 10).....	3.80c.
Common wire nails, base per keg.....	\$3.65
Black wire, base per 100 lb.....	3.90

at others. The largest plant of the district has increased its open-hearth operation and is consuming a great deal of scrap. This mill has large old orders out and dealers have offered as high as \$14.75 for heavy melting steel to ship against them. This factor has kept the Buffalo market above outside markets.

Prices per gross ton, f.o.b. Buffalo consumers' plants:

Basic Open-Hearth Grades		
No. 1 heavy melting steel.....	\$14.25 to	\$14.50
No. 2 heavy melting steel.....	12.50 to	13.00
Scrap rails	13.25 to	13.75
Hydraulic compressed sheets....	11.50 to	12.00
Hand bundled sheets.....	8.50 to	9.00
Drop forge flashings	11.50 to	12.00
No. 1 busheling	13.00 to	13.25
Heavy steel axle turnings	12.75 to	13.25
Machine shop turnings	9.25 to	9.50
Acid Open-Hearth Grades		
Railroad knuckles and couplers..	15.50 to	15.75
Railroad coil and leaf springs...	16.00 to	16.50
Rolled steel wheels.....	14.75 to	15.25
Low phosphorus billet and bloom ends	15.75 to	16.00
Electric Furnace Grades		
Heavy steel axle turnings.....	12.75 to	13.25
Short shoveling steel turnings...	10.75 to	11.00
Blast Furnace Grades		
Short shoveling steel turnings...	10.75 to	11.00
Short mixed borings and turnings	9.75 to	10.00
Cast iron borings	10.00 to	10.50
No. 2 busheling	9.00 to	9.50
Rolling Mill Grades		
Steel car axles.....	14.50 to	15.00
No. 1 railroad wrought	12.00 to	12.50
Cupola Grades		
No. 1 machinery cast.....	14.50 to	15.00
Stove plate	12.75 to	13.00
Locomotive grate bars	10.50 to	11.00
Steel rails, 3 ft. and under.....	16.00 to	16.50
Cast iron carwheels	14.00 to	14.50
Malleable Grades		
Railroad	14.00 to	14.50
Agricultural	14.00 to	14.50
Industrial	14.00 to	14.50

Boston

Flood Damage Still Uncertain—Scrap Market More Active

BOSTON, Nov. 15.—With the New England flood a week behind, losses to industry and iron and steel requirements are still largely undetermined. Since telephone connections with the stricken areas were resumed there has been an urgent call for nails, spikes, bolts, nuts, light structural shapes, and such heavy hardware as picks, crowbars, heavy hammers, heavy duty shovels, etc. The Central Vermont Railroad is the hardest hit of the New England carriers, and it probably will be more than a month before it is operating on a normal basis. It has lost one stretch of four to six miles of trackage, and has placed a small emergency order for rails. It has lost five sizable bridges, the Maine Central Railroad has lost one, and the Boston & Maine Railroad at least three. The structural steel tonnage involved will run into four figures. Road ballast is more needed by the railroads in Vermont and New Hampshire than iron and steel. The Boston & Albany Railroad was hard hit in western Massachusetts, but is operating practically on a normal basis. It is believed

Warehouse Prices, f.o.b. Boston

	Base per Lb.
Plates	3.365c.
Structural shapes—	
Angles and beams	3.365c.
Tees	3.365c.
Zees	3.465c.
Soft steel bars and small shapes.....	3.265c.
Flats, hot-rolled	4.15c.
Reinforcing bars	3.265c. to 3.54c.
Iron bars—	
Refined	3.265c.
Best refined	4.60c.
Norway, rounds	6.60c.
Norway, squares and flats	7.10c.
Spring steel—	
Open-hearth	5.00c. to 10.00c.
Crucible	12.00c.
Tire steel	4.50c. to 4.75c.
Bands	4.015c. to 5.00c.
Hoop steel	5.50c. to 6.00c.
Cold rolled steel—	
Rounds and hexagons.....	4.05c.
Squares and flats	4.55c.
Toe calk steel	6.00c.

in local steel circles that heavy steel losses in the flooded area will be comparatively small as the railroads will be able to recover most of the damaged material.

Pig Iron.—Buying of pig iron is confined to small tonnages for special mixture purposes. Aggregate sales the past week fell considerably short of 2000 tons in this territory. A Bridgeport, Conn., foundry is inquiring for 500 tons of No. 2X, first quarter shipment, and two other Connecticut foundries want smaller tonnages. Otherwise, foundries show practically no interest in 1928 requirements. Buffalo iron at \$16 a ton, base, apparently has been withdrawn from the market, and the minimum price today is \$16.50 for No. 2 plain and No. 2X. Indian iron is offered at \$22 a ton on dock here. The Mystic Iron Works' minimum price is \$19 a ton, furnace. That stack's shipments are establishing new high records. Its average daily run in October was 502 tons, while so far this month it has averaged 550 tons, with 572 tons the largest output for any one day. The Whiting Machine Works, Whitinsville, Mass., has increased its operating schedule to 60 per cent of capacity, but the improvement there is more than offset by enforced foundry closings in Vermont, due to recent floods.

Prices of foundry iron per gross ton, delivered to most New England points:

Buffalo, sil. 1.75 to 2.25.....	\$21.41 to \$21.91
Buffalo, sil. 2.25 to 2.75.....	21.91 to 22.41
East. Penn., sil. 1.75 to 2.25.....	22.65 to 23.15
East. Penn., sil. 2.25 to 2.75.....	23.15 to 23.65
Virginia, sil. 1.75 to 2.25.....	25.96 to 26.21
Virginia, sil. 2.25 to 2.75.....	26.46 to 26.71
Alabama, sil. 1.75 to 2.25.....	22.91 to 24.77
Alabama, sil. 2.25 to 2.75.....	23.41 to 25.27

Freight rates: \$4.91 from Buffalo, \$3.65 from eastern Pennsylvania, \$5.21 all rail from Virginia, \$6.91 to \$8.77 from Alabama.

Warehouse Business.—The movement of iron and steel out of warehouses increased noticeably in the past week. Not only has there been an increase in the number of sales, but individual orders call for larger amounts of material. Prices remain more or less subject to concessions owing to offers of foreign material at prices considerably under those for domestic material.

Coke.—Both the New England Coal & Coke Co. and the Providence Gas Co. report shipments of by-product foundry coke as running approximately 15 per cent ahead of a month ago and about on a par with those of a year ago. The increase over last month is not due to increased melt, but to stocking for winter by some foundries. The price of foundry fuel remains at \$12 a ton, delivered within a \$3.10 freight rate zone. The demand for domestic coke fluctuates with weather conditions. The New England Coal & Coke Co.'s sales for 1927 to date are about 40 per cent ahead of last year.

Old Material.—Although far from active, there is a freer movement of old material to points in and outside New England. Off-grade stove plate at \$6 to \$7 a ton on cars, cuttings and punchings at \$6, steel scrap at \$9.50 a ton, delivered, and sheared pipe at the same price, have figured in recent purchases by the Mystic Iron Works, Everett, Mass. Cuttings and punchings for Pennsylvania delivery have sold at \$4, shipping point, and short bundles of cotton ties at \$6.15. One lot of 100 tons of chemical borings sold at \$15 a ton, delivered in New Jersey, or \$10 on cars here. Cancellations

Warehouse Prices, f.o.b. Cincinnati

	Base per Lb.
Plates and structural shapes....	3.40c.
Bars, soft steel or iron.....	3.30c.
Reinforcing bars	3.30c.
Hoops	4.00c. to 4.25c.
Bands	3.95c.
Cold-finished rounds and hexagons	3.85c.
Squares	4.35c.
Open-hearth spring steel.....	4.75c. to 5.00c.
Black sheets (No. 24).....	4.05c.
Galvanized sheets (No. 24).....	4.90c.
Blue annealed sheets (No. 10)...	3.60c.
Structural rivets	3.85c.
Small rivets.....	.65 per cent off list
No. 9 annealed wire, per 100 lb.....	\$3.00
Common wire nails, base per keg.....	2.95
Cement coated nails, base 100 lb. keg.....	2.95
Chain, per 100 lb.....	7.55
Net per 100 Ft.	
Lap-welded steel boiler tubes, 2-in.....	\$18.00
4-in.	38.00
Seamless steel boiler tubes, 2-in.....	19.00
4-in.	39.00

of specification pipe shipments by one of the largest Pennsylvania users have sent the market here off 50c. a ton. Forge flashings and street car axles are also 50c. lower. Prices otherwise remain steady and unchanged. Sales in the past few days include yard steel at around \$6 to \$6.20 a ton on cars, shipping point, and No. 1 machinery cast at \$15.50 to \$16 a ton on cars, for Pennsylvania shipment. Local brokers say the eastern Pennsylvania scrap market is much more stable than the Pittsburgh district.

Buying prices per gross ton f.o.b. Boston rate shipping points:

No. 1 heavy melting steel	.....	\$8.50 to \$9.00
Scrap rails	.....	8.50 to 8.75
No. 1 railroad wrought	.....	10.50 to 11.00
No. 1 yard wrought	.....	8.50 to 9.00
Machine shop turnings	.....	5.50 to 6.00
Cast iron borings (steel works and rolling mill)	.....	6.00 to 6.50
Bundled skeleton, long	.....	5.00 to 5.60
Forge flashings	.....	5.50 to 6.00
Blast furnace borings and turnings	.....	5.50 to 6.00
Forge scrap	.....	5.75 to 6.00
Shafting	.....	13.00 to 13.50
Street car axles	.....	16.50 to 17.00
Wrought pipe (1 in. in diameter, over 2 ft. long)	.....	7.50 to 8.00
Rails for rerolling	.....	10.00 to 10.50
Cast iron borings, chemical	.....	10.00 to 10.50
Textile cast	.....	\$14.50 to \$15.00
No. 1 machinery cast	.....	14.50 to 15.00

Prices per gross ton delivered consumers' yards:

No. 2 machinery cast	.....	12.00 to 12.50
Stove plate	.....	11.00 to 11.50
Railroad malleable	.....	13.50 to 14.00

Cincinnati

Low Prices Fail to Stimulate 1928 Pig Iron Buying

CINCINNATI, Nov. 15.—Dullness continues in pig iron and indications are that the apathy shown by buyers in recent weeks will remain until at least Dec. 1. Total sales in the past week have fallen short of 3000 tons and with the exception of an inquiry for 500 tons of foundry iron for a northern Indiana melter, pending business is negligible. The price situation is virtually unchanged. Lake Erie iron is selling at \$16 to \$17, base furnace, while southern Ohio foundry iron still is being held at \$19, base Ironton. Southern producers are seeking orders at \$16, base Birmingham, but have not taken any tonnages at that figure for delivery in 1928. Silvery iron bookings have been light, but prices are firm.

Prices per gross ton, delivered Cincinnati:

So. Ohio fdy., sil. 1.75 to 2.25...	\$20.89
So. Ohio malleable	\$20.14 to 20.89
Alabama fdy., sil. 1.75 to 2.25...	19.69
Alabama fdy., sil. 2.25 to 2.75...	20.19
Tennessee fdy., sil. 1.75 to 2.25...	19.69
Southern Ohio silvery, 8 per cent	28.89

Freight rates, \$1.89 from Ironton and Jackson, Ohio; \$3.69 from Birmingham.

Finished Material.—While there has been no appreciable increase in orders and specifications, the underlying tone of the market is firmer. Several producers report improvement in the demand for heavy steel products, such as bars, shapes and plates, the betterment having come from consumers in the general industrial field. Most fabricating shops are operating on a restricted basis because of the shortage of new jobs. In an endeavor to obtain work to step up production schedules, fabricators are submitting low prices on projects which have been active in the past two weeks. There is a substantial number of construction plans now in the formative period, but these probably will not come out for two or three months. Sheet mills have failed to add enough business in the past week to justify an expansion of operations, which now stand at about 65 per cent of capacity. Encouragement is found, however, in the fact that some buyers are making inquiries about first quarter requirements, which perhaps is an indication that consumers believe that prices are not likely to decline further and that advantage should be taken of the present situation to purchase material for delivery after Jan. 1. Sheet producers, on the other hand, are not seeking orders for 1928 on the basis of current quotations, and whether they would accept much tonnage at today's figures has not been determined. Automobile manufacturers have slowed down activities, but January production of motor cars is ex-

pected to be heavy. Sheet makers, therefore, are counting upon good orders being placed late this month or early in December for delivery to companies in the Detroit district. Meanwhile, blue annealed stock is selling at 2.10c., base Pittsburgh, and black at 2.90c. Galvanized sheets range from 3.65c. to 3.75c. Common wire nails remain at \$2.69 per keg, delivered Cincinnati.

Warehouse Business.—In the first half of November sales declined slightly from the level which had been maintained consistently since Sept. 1. Orders have been fairly numerous, but jobbers continue to complain about the fact that the aggregate tonnage is light. Quotations on all products are showing strength.

Coke.—The coke market is showing signs of weakness. Specifications of by-product foundry coke have been only fair, and the demand for domestic grades has been far below expectations. The Detroit market is glutted with domestic coke from by-product companies and from a large automobile manufacturer, so that movement of coke from the Portsmouth-Ashland district to that city has been curtailed. Domestic by-product coke from Massillon and Canton has been making considerable headway in western Ohio and eastern Indiana, the delivered price being less than from ovens at Ashland and at Portsmouth.

Foundry coke prices per net ton, delivered Cincinnati: By-product coke, \$9.52 to \$9.64; Wise County coke, \$7.59 to \$8.09; New River coke, \$10.09 to \$10.59. Freight rates: \$2.14 from Ashland, Ky.; \$2.59 from Wise County and New River ovens.

Old Material.—While heavy melting steel remains at \$11 to \$11.50, the prices quoted a week ago, a number of other items have declined an average of 50c. a ton. Steel companies are accepting moderate tonnages on contract, but are refraining from making purchases for future delivery. The Chesapeake & Ohio has a list of 8000 tons, including 2000 tons of No. 3 rails, closing this week.

Dealers' buying prices per gross ton f.o.b. cars, Cincinnati:

Heavy melting steel	.....	\$11.00 to \$11.50
Scrap rails for melting	.....	11.75 to 12.25
Loose sheet clippings	.....	8.50 to 9.00
Bundled sheets	.....	9.50 to 10.00
Cast iron borings	.....	8.50 to 9.00
Machine shop turnings	.....	8.00 to 8.50
No. 1 busheling	.....	10.50 to 11.00
No. 2 busheling	.....	7.50 to 8.00
Rails for rolling	.....	13.00 to 13.50
No. 1 locomotive tires	.....	13.50 to 14.00
No. 1 railroad wrought	.....	11.00 to 11.50
Short rails	.....	17.00 to 17.50
Cast iron carwheels	.....	12.75 to 13.25
No. 1 machinery cast	.....	16.00 to 17.00
No. 1 railroad cast	.....	13.50 to 14.00
Burnt cast	.....	8.00 to 8.50
Stove plate	.....	9.25 to 9.75
Brake shoes	.....	10.00 to 10.75
Railroad malleable	.....	12.50 to 13.00
Agricultural malleable	.....	12.00 to 12.50

San Francisco

Foreign Structural Material \$14 a Ton Under Domestic on Coast

SAN FRANCISCO, Nov. 12 (by Air Mail).—The award of 1300 tons of reinforcing bars for the Butler Building, San Francisco, booked by Badt-Falk Co., and the letting of 4163 tons of 6-in. class B cast iron pipe by Los Angeles to the Pacific States Cast Iron Pipe Co. were the major developments of the week.

October building construction held very steady throughout the western territory and in the majority of large centers the level of activity was slightly higher than during the same month of 1926. Permit valuations issued in the four leading centers on the Coast are as follows: Los Angeles, \$10,388,098; San Francisco, \$2,518,374; Portland, \$2,211,836; Seattle, \$1,296,255.

Pig Iron.—Nothing of importance transpired this week, both sales and inquiries being limited to small lots. A large shipment of Indian iron is scheduled to arrive on the Coast during the next 10 days and approximately 500 tons will be unloaded at Los Angeles and at San Francisco. A report of iron imports in August shows that 1632 tons entered through the San Francisco district, 300 tons through the Los Angeles district and 500 tons through the Seattle district. Of this total, nearly 1500 tons was Indian iron. Prices remain unchanged.

Shapes.—Low prices on fabricated and erected steel

continue to prevail, due not only to keen competition for business but also to the fact that considerable foreign material is now entering into fabricated projects. Foreign material is being quoted at about 1.70c., c.i.f., duty paid, or \$14 a ton under the price of domestic shapes. The majority of awards during the week called for small tonnages, only one project, involving 100 tons being reported. The Central Iron Works took 100 tons for an apartment in San Francisco. New projects up for quotations include 900 tons for a viaduct for the Union Pacific in Seattle and 700 tons for an addition to the Medical Building, San Francisco. Bids will be opened on Dec. 6 for 180 tons for a bridge at Phoenix, Ariz. Imports of foreign shapes during August were as follows: Los Angeles, 843 tons; San Francisco, 1848 tons; Portland, 259 tons; Seattle, 117 tons.

Prices per gross ton at San Francisco:

*Utah basic	\$25.00 to \$26.00
*Utah foundry, sil. 2.75 to 3.25...	25.00 to 26.00
*Indian foundry, sil. 2.75 to 3.25...	25.00
**German foundry, sil. 2.75 to 3.25.	24.25

*Delivered San Francisco.

**Duty paid, f.o.b. cars San Francisco.

Plates.—Awards of plates during the week involved small lots only and little business is pending. The Southern Pacific Co. has placed 75 tons with an Eastern mill. Bids were opened this week at Phoenix, Ariz., for the reconstruction of the Verde pipe line, calling for 600 tons of Nos. 10 and 12-gage blue annealed sheets or 1000 tons of 3/16-in. plates. Alternate bids were also taken on reinforced concrete, wood and cast iron pipe. The price situation continues unchanged at 2.40c., c.i.f. Coast ports.

Bars.—During August over 3500 tons of foreign bars entered Coast ports. This material was distributed as follows: Los Angeles, 1274 tons; San Francisco, 2140 tons; Portland, 224 tons. Just how much of this tonnage was mild steel and how much was reinforcing material cannot be ascertained as the custom house records make no distinction. One of the largest awards of the year was placed with Badt-Falk Co. and called for 1300 tons for the Butler Building. Other business involved 375 tons for the Echo Dam at Salt Lake City and 275 tons for three bridges in Oregon. Mill representatives and jobbers are interested in an 8500-ton inquiry for the Coyote Point bridge across San Francisco Bay, bids on which are being received. The Southern Pacific Co. has placed 50 tons of rivets with an Eastern maker at a price reported to be 2.65c., base, Pittsburgh, or equivalent.

Cast Iron Pipe.—Of interest this week was the award of 4163 tons of 6-in. class B pipe for Los Angeles to the Pacific States Cast Iron Pipe Co. This tonnage went at better than \$36 a ton, delivered. Other awards involved 182 tons of 6 and 12-in. class B pipe for Santa Barbara, Cal., booked by the National Cast Iron Pipe Co., and 142 tons of 6-in. class B pipe for Phoenix, Ariz., placed with Crane Co. Bids were opened this week on a pipe line at Phoenix, Ariz., on which figures were taken on steel, wood, concrete and cast iron pipe. Approximately 3600 tons of 36-in. class A cast iron pipe is involved. The Market Street improvement job, San Diego, Cal., bids on which open Nov. 28, will require 1082 tons of 6 to 12-in. class B pipe. B. Nicoll & Co. were low bidders on 300 tons of 4 and 8-in. class B pipe for Burbank, Cal. On Nov. 14 bids will be opened on 153 tons of 4 and 6-in. class B pipe for the Campo Road improvement job at San Diego, Cal. Imports of foreign material during August show the following tonnages delivered at various Pacific Coast ports: Los Angeles, 3403 tons; San Francisco, 421 tons; Seattle, 387 tons.

Warehouse Prices, f.o.b. San Francisco

Base per Lb.

Plates and structural shapes.....	3.15c.
Soft steel bars	3.15c.
Small angles, $\frac{3}{8}$ -in. and over.....	3.15c.
Small angles, under $\frac{3}{8}$ -in.	3.55c.
Small channels and tees, $\frac{3}{4}$ -in. to 2 $\frac{1}{4}$ -in..	3.75c.
Spring steel, $\frac{1}{4}$ -in. and thicker.....	5.00c.
Black sheets (No. 24).....	4.80c.
Blue annealed sheets (No. 10).....	3.75c.
Galvanized sheets (No. 24).....	5.35c.
Structural rivets, $\frac{1}{2}$ -in. and larger.....	5.65c.
Common wire nails, base per keg.....	\$3.25
Cement coated nails, 100-lb. keg.....	3.35

Steel Pipe.—Quietness continues in the market for standard pipe and oil country goods. Ventura, Cal., will open bids on Dec. 5 for a pipe line and paving project involving 79,000 ft. of 3-in. standard pipe totaling 295 tons. Importations of tubular products during August were as follows: Los Angeles, 1233 tons; San Francisco, 511 tons; Seattle, 50 tons.

Rails.—Bids were opened this week in Seattle for 1150 tons of rails for the municipal railroad, only two submitting figures, the United States Steel Products Co. and Bethlehem Steel Co., the latter being low. The material called for involves 550 tons of 60 and 80-lb. T rails and 600 tons of 80, 116 and 127-lb. girder rails. No other inquiries of importance are up for figures.

Coke.—The next large shipment of foreign coke is due to arrive on the Coast from England late in December. Approximately 4000 tons of English beehive and by-product (Victoria) coke is involved and this tonnage will be divided between San Francisco and Los Angeles. Quotations remain the same as reported last week.

Sizes and Types of Malleable Foundry Refractories Sharply Reduced

WASHINGTON, Nov. 15.—Covering definite sizes, shapes and types of malleable foundry refractories, a simplified practice recommendation was adopted here at a meeting on Wednesday of last week at the Department of Commerce of manufacturers, distributors and consumers. The adopted recommendation will become effective Feb. 1, 1928, to continue for a year, and will be subject to annual revision by similar conferences or through committee action.

The recommendation is in five parts, embracing door opening tile; tap-out blocks; shapes for sidewalks, bridge walls, etc.; shapes for bungs and shapes for stacks. The conference estimated that simplification of types of tap-out blocks will reduce the variations from 150 to two; of shapes for sidewalks, bridge walls, etc., from 27 to eight; of shapes for bungs from 11 to five, with no change for shapes for stacks. Door-opening tile is a new item.

The present subcommittee on malleable foundry refractories will serve as a standing committee for the simplified practice recommendation. Its personnel is as follows: H. M. Thompson, chairman, president H. M. Thompson Co., Chicago; H. M. Birdsong, metallurgist, Buffalo; James R. Allan, International Harvester Co., Chicago.

Five years have elapsed since the American Foundrymen's Association first requested the services of the Division of Simplified Practice in the interest of simplification, and the successful completion of this project is attributed primarily to the joint committee on foundry refractories and its subcommittees. Mr. Allan, chairman of the subcommittee responsible for the adopted standards, said that this initial step for the betterment of foundry practices will be of great advantage to manufacturers, distributors and users and at the same time opens the door to further simplifications in this over-diversified field.

Those attending the meeting were: Lieut. J. T. Bottom, Navy Department; R. A. Heindle, Bureau of Standards; N. R. Colwell, Division of Simplified Practice; W. H. Funk and Fred A. Harvey, Harbison-Walker Refractories Co., Pittsburgh; James T. MacKeazie, American Cast Iron Pipe Co., Birmingham; Paul G. Willettes, Hartford Empire Co., Hartford, Conn.; M. C. Booze, Charles Taylor Sons Co., Cincinnati; L. A. Hewitt, Laclede-Christy Clay Products Co., St. Louis; C. E. Bales, Ironton Fire Brick Co., Ironton, Ohio; L. J. Trostel, the General Refractories Co., Baltimore; J. L. Cummings, American Foundrymen's Association, Riverside, Ill.; H. M. Thompson, H. M. Thompson Co., Chicago, and James R. Allan, International Harvester Co., Chicago.

Magnesite Duties Increased 50 Per Cent

WASHINGTON, Nov. 15.—President Coolidge on Thursday of last week issued a proclamation increasing the duty on crude and caustic calcined magnesite by 50 per cent. Dead burned magnesite was not affected.

NON-FERROUS METAL MARKETS

**The
Week's
Prices**

Cents per Pound
for
Early Delivery

	Nov. 15	Nov. 14	Nov. 12	Nov. 11	Nov. 10	Nov. 9
Lake copper, N. Y.	13.55	13.55	13.55	13.55	13.55	13.55
Electrolytic copper, N. Y.* ..	13.25	13.25	13.25	13.25	13.25	13.25
Straits tin, spot, N. Y.	57.00	57.50	...	56.80	56.00	56.25
Lead, New York.....	6.25	6.25	6.25	6.25	6.25	6.25
Lead, St. Louis.....	6.00	6.00	6.00	6.00	6.00	6.00
Zinc, New York.....	6.02½	6.00	5.97½	5.97½	5.95	5.95
Zinc, St. Louis.....	5.67½	5.65	5.62½	5.62½	5.60	5.60

*Refinery quotation; delivered price ¼c. higher.

NEW YORK, Nov. 15.—Strength in copper is firmly maintained and buying of tin has been quite heavy at slightly higher levels. The lead market is unchanged and some strength has finally appeared in zinc.

Copper.—Foreign buying is the feature of the market. Consumers in Germany, England and France have bought very heavily the past week and this movement has helped to sustain the market here. This buying from abroad has continued despite an increase by Copper Exporters, Inc., of its quotation from 13.70c. to 13.80c., c.i.f. Hamburg, effective Nov. 8. Domestic consumers have not been very active the past week, but the price of electrolytic copper remains firm at 13.50c., delivered in the Connecticut Valley. No metal can be bought below this level and some producers are out of the market except at higher prices. Statistics for October were favorable to producers in that they showed a decrease in stocks of refined metal of about 2600 tons. Production, however, was much higher than in the month previous and was one of the heaviest of the year. Lake copper is quoted at 13.50c. to 13.60c., delivered.

Tin.—Sales for the week ended Saturday, Nov. 12, were 1750 tons, with dealers taking the bulk. Consumers bought some metal, but the proportion was small in comparison. The most active day was Friday, when very heavy sales were recorded, with short covering also a factor. There has been a failure in the trade

of one of the smaller dealers who was long on tin, but no one else was harmed. Yesterday, Monday, the market was stagnant, and today about 300 tons changed hands, with spot Straits tin quoted at 57c., New York. In London quotations were about £3 to £4 per ton higher than a week ago, with spot standard quoted at £261 17s. 6d., future standard at £256 5s., and spot Straits at £269 17s. 6d. The Singapore price today was £260 5s. Arrivals thus far this month have been 2470 tons, with 3770 tons reported afloat.

Lead.—A better tone is in evidence and the market is quiet but steady. Conditions and prices are again unchanged. The leading interest still quotes 6.25c., New York, as its contract price and the quotation in the outside market is 6c., St. Louis. Each day a fair amount of business is reported booked.

Zinc.—A slightly better tone is detected in the market for prime Western zinc, but the betterment is not pronounced. During the past week that brand sold as low as 5.60c., St. Louis, from which low point it has slowly advanced until today it is quoted at 5.67½c., St. Louis, or 6.02½c., New York. A good business was done at the lower levels, particularly at 5.65c., yesterday. The ore situation continues unsatisfactory, with production last week at about 15,000 tons and sales considerably less. Stocks have advanced to around 35,000 tons and the price is unchanged at \$35 per ton, Joplin. Statistics for October show an increase in stocks of refined metal of about 2000 tons, with production higher than the month before.

Nickel.—Wholesale lots of ingot nickel are quoted at 35c., with shot nickel at 36c. and electrolytic nickel at 39c. per lb.

Antimony.—Conditions in Hankow, China, are expected to unsettle the market, which today is quoted

Metals from New York Warehouse

Delivered Prices Per Lb.

Tin, Straits pig.....	59.00c. to 60.00c.
Tin, bar	61.00c. to 62.00c.
Copper, Lake	14.75c.
Copper, electrolytic	14.50c.
Copper, casting	13.75c.
Zinc, slab	7.37½c. to 8.37½c.
Lead, American pig	7.50c. to 8.50c.
Lead, bar	9.75c. to 10.75c.
Antimony, Asiatic	12.75c. to 13.25c.
Aluminum No. 1 ingot for remelting (guaranteed over 99 per cent pure) ..	27.00c. to 28.00c.
Aluminum ingots, No. 12 alloy ..	26.00c. to 27.00c.
Babbitt metal, commercial grade ..	30.00c. to 40.00c.
Solder, ½ and ½	39.25c. to 40.25c.

Metals from Cleveland Warehouse

Delivered Prices Per Lb.

Tin, Straits pig.....	63.50c.
Tin, bar	65.50c.
Copper, Lake	14.50c.
Copper, electrolytic	14.50c.
Copper, casting	14.00c.
Zinc, slab	7.75c.
Lead, American pig	7.00c.
Antimony, Asiatic	16.00c.
Lead, bar	9.25c.
Babbitt metal, medium grade ..	19.50c.
Babbitt metal, high grade	66.75c.
Solder, ½ and ½	37.75c.

Rolled Metals from New York or Cleveland Warehouse

Delivered Prices, Base Per Lb.

Sheets—	
High brass	18.50c. to 19.25c.
Copper, hot rolled.....	22.25c. to 23.25c.
Copper, cold rolled, 14 oz. and heavier,	24.50c. to 25.50c.
Seamless Tubes—	
Brass	23.37½c. to 24.37½c.
Copper	24.25c. to 25.25c.
Brazed Brass Tubes.....	26.50c. to 27.50c.
Brass Rods	16.25c. to 17.25c.

From New York Warehouse

Delivered Prices, Base Per Lb.

Zinc sheets (No. 9), casks.....	10.50c. to 11.00c.
Zinc sheets, open	11.00c. to 11.25c.

Non-Ferrous Rolled Products

Mill prices on copper in rolls, copper wire and hot rolled copper sheets were advanced ¼c. on Nov. 10. Bronze, brass and other copper products have not changed since Aug. 3. Zinc sheets and lead full sheets are being quoted at the advances of Aug. 5 and Oct. 5, respectively.

List Prices, Per Lb., f.o.b. Mill

On Copper and Brass Products, Freight up to 75c. per 100 Lb. Allowed on shipments of 500 Lb. or Over

Sheets—	
High brass	18.25c.
Copper, hot rolled.....	22.25c.
Zinc	10.00c.
Lead (full sheets).....	9.75c. to 10.00c.
Seamless Tubes—	
High brass	23.12½c.
Copper	24.00c.
Rods—	
High brass	16.00c.
Naval brass	18.75c.
Wire—	
Copper	15.50c.
High brass	18.75c.
Copper in Rolls.....	21.25c.
Brazed Brass Tubing	26.25c.

Aluminum Products in Ton Lots

The carload freight rate is allowed to destinations east of Mississippi River and also allowed to St. Louis on shipments to destinations west of that river.

Sheets, 0 to 10 gage, 3 to 30 in. wide....	33.00c.
Tubes, base	42.00c.
Machine rods	34.00c.

Rolled Metals, f.o.b. Chicago Warehouse (Prices Cover Trucking to Customers' Doors in City Limits)	
Base per Lb.	
Sheets—	
High brass	19.25c.
Copper, hot rolled.....	22.25c.
Copper, cold rolled, 14 oz. and heavier.....	24.50c.
Zinc	11.00c.
Lead, wide	9.75c.
Seamless Tubes—	
Brass	24.62½c.
Copper	25.50c.
Brass Tubes.....	26.25c.
Brass Rods	16.00c.

at 10.75c., New York, for all positions for Chinese metal.

Aluminum.—Virgin metal, 98 to 99 per cent pure, is quoted at 25c. per lb., delivered.

Non-Ferrous Metals at Chicago

Nov. 15.—The demand for copper is active and the price has advanced. Sales of zinc are in fair volume and prices have recovered in part from the low point reached early in the week. Offerings of old metals are large and prices are weak.

Prices, per lb., in carload lots: Lake copper, 13.75c.; tin, 58.50c.; lead, 6.10c.; zinc, 5.75c.; in less-than-carload lots, antimony, 12c. On old metals we quote copper wire, crucible shapes and copper clips, 10c.; copper bottoms, 9c.; red brass, 9c.; yellow brass, 6.75c.; lead pipe, 5c.; zinc, 3.50c.; pewter, No. 1, 34c.; tin foil, 43.50c.; block tin, 52c.; aluminum, 13c.; all being dealers' prices for less-than-carload lots.

RAILROAD EQUIPMENT

Inquiry for 200 Gondola Cars—10 Locomotives Purchased

Inquiry for 200 gondola cars for the Chicago, St. Paul, Minneapolis & Omaha is the largest item in the week's equipment business. More than 100 cars have been bought in this country by a Chinese railroad. Purchase of 10 locomotives and an inquiry for an equal number reflect more activity than this branch of the railroad equipment market has had in some time. Details of the week's business follow:

The Canadian National Railways have ordered 10 8-wheel switching locomotives for service on the Grand Trunk Western lines from the Baldwin Locomotive Works.

The Chicago, St. Paul, Minneapolis & Omaha is inquiring for 200 50-ton gondola cars.

The Newburgh & South Shore is in the market for four 8-wheel switching locomotives.

The Great Northern Equipment Co. will buy four heater cars.

The Maine Central has ordered two combination baggage and mail cars from the Osgood Bradley Car Co.

The Algoma Central & Hudson Bay will purchase two locomotives.

The Kirin Hailung, China, has purchased 30 box cars, 20 flat cars, 24 high-side gondola cars and 40 low-side gondola cars, all of 40-ton capacity, from the Koppel Industrial Car & Equipment Co.

The Mexican Railway Co., Ltd., is inquiring for from two to four Pacific-type locomotives.

It is reported that the Louisville & Nashville will soon come into the market for 2500 miscellaneous freight cars.

The Pittsburgh Foundrymen's Association will observe an electric furnace night at its monthly dinner and meeting at the Fort Pitt Hotel, Pittsburgh, Monday evening, Nov. 21. The speakers are F. W. Brooke, chief engineer, and George P. Mills, electrical engineer, William Swindell & Brothers, Pittsburgh. Mr. Brooke's topic is, "Recent Developments in Melting Equipment for Castings by the Use of the Electric Furnace," and that of Mr. Mills, "Annealing and Heat Treating Castings by the Use of the Electric Furnace." Both papers will be illustrated by lantern slides.

Old Metals, Per Lb., New York

The buying prices represent what large dealers are paying for miscellaneous lots from the smaller accumulators and the selling prices are those charged consumers after the metal has been properly prepared for their use.

	Dealers' Buying Prices	Dealers' Selling Prices
Copper, heavy crucible	11.25c.	12.75c.
Copper, heavy and wire....	11.00c.	12.25c.
Copper, light and bottoms...	9.50c.	10.50c.
Brass, heavy	7.00c.	8.50c.
Brass, light	5.75c.	7.25c.
Heavy machine composition.	9.00c.	10.25c.
No. 1 yellow brass turnings.	7.75c.	8.25c.
No. 1 red brass or composition turnings	8.25c.	9.25c.
Lead, heavy	5.125c.	5.375c.
Lead, tea	4.25c.	4.75c.
Zinc	3.75c.	4.25c.
Sheet aluminum	13.00c.	15.00c.
Cast aluminum	12.75c.	14.75c.

REINFORCING STEEL

San Francisco Bridge Will Require 8500 Tons—Awards of 5000 Tons

Including a bridge at San Francisco, which will take 8500 tons, inquiries for concrete reinforcing bars, as reported to THE IRON AGE in the last week, amounted to 13,000 tons. Awards totaled nearly 5000 tons, the largest single job being a business building in San Francisco, requiring 1300 tons. Awards follow:

BOSTON, 100 tons, City Hospital officers' quarters, to Morrison-Stevens Co.

BROOKLYN, 110 tons, Brooklyn Law School, to Igoo Brothers.

ANDERSON, S. C., 100 tons, textile plant addition for Appleton Mfg. Co., to Connors Steel Co., Birmingham.

CHICAGO, 230 tons, substructure for the Crawford Avenue bridge, to Barton Spiderweb System.

CHICAGO, 135 tons, factory for Beckley Ralston Co., to Barton Spiderweb System.

CHICAGO, 125 tons, administration building for Garfield Park, to Barton Spiderweb System.

CHICAGO, 800 tons, soap factory for James S. Kirk & Co., to Barton Spiderweb System.

CHICAGO, 275 tons of rail steel bars, Belmont-Lincoln Y. M. C. A., to Inland Steel Co.

CHICAGO, 100 tons, apartment building at 6230 Dorchester Avenue, to Olney J. B. Dean & Co.

ST. LOUIS, 800 tons, factory for National Candy Co., to Laclede Steel Co.

OKLAHOMA CITY, OKLA., 250 tons, floors for office building for Southwestern Bell Telephone Co., to Laclede Steel Co.

SALT LAKE CITY, UTAH, 375 tons, Echo Dam, to an unnamed interest.

SAN FRANCISCO, 1300 tons, Butler Building, to Badt-Falk Co.

SALEM, ORE., 150 tons, Mills Creek bridge, to an unnamed company.

PORTLAND, ORE., 125 tons, two bridges on Canyon Road, to an unnamed company.

Reinforcing Bars Pending

Inquiries for reinforcing steel bars include the following:

CLEVELAND, 200 tons, John Hay senior high school.

BOSTON, 1000 tons, Pierce Building on Broad Street.

CAMBRIDGE, MASS., 400 tons, previously reported as 100 tons, Lever Brothers warehouse.

WALTHAM, MASS., 200 tons, Metropolitan State Hospital.

BRISTOL, R. I., 450 tons, bridge.

BROOKLYN, 400 tons, building for E. R. Squibb & Sons; Russell G. Cory, architect.

NEWARK, 300 tons, bridge across Newark Bay for Pennsylvania and Lehigh Valley railroads; Henry Steeres, Inc., contractor.

BUFFALO, 300 to 400 tons, bins for Huron Cement Co.

BUFFALO, 100 tons, bagging house for Huron Cement Co.

CHICAGO, 350 tons, Forman High School.

CHICAGO, 900 tons, apartment building at Glenlake Avenue and Sheridan Road. William Reichert is architect.

SAN FRANCISCO, 8500 tons for Coyote Point bridge, bids being taken by Raymond Concrete Pile Co.

FABRICATED STRUCTURAL STEEL

Cleveland Bridge Takes 18,000 Tons—Only 10,250 Tons Added to Pending Work

Structural awards during the week amounted to 29,300 tons, of which 18,000 tons was represented by a bridge at Cleveland. New inquiries amounted to less than 10,250 tons, the lowest total in two months. Awards follow:

PHILADELPHIA, 2200 tons, Hahnemann Medical College and Hospital, to Bethlehem Steel Co.
 RUNNEMEDE, N. J., 215 tons, bridge over Big Timber Creek, to Phoenix Bridge Co.
 DUBUQUE, IOWA, 130 tons, vertical chambers for steel works ovens, to Mississippi Valley Structural Steel Co.
 HAMMOND, IND., 100 tons, boiler supports for State Line Generating Co., to Vierling Steel Works, Chicago. This is in addition to recent awards.
 STATE OF VERMONT, 250 tons, bridge for Maine Central Railroad, to an unnamed fabricator.
 FRAMINGHAM, MASS., 100 tons, office building, West Boston Gas Co., to New England Structural Co.
 JEWETT CITY, CONN., 271 tons, Aspinook Power Co., boiler house addition, to Eastern Bridge & Structural Co.
 BOSTON & MAINE RAILROAD, 350 tons, bridge at Hoosick Falls, N. Y., to Phoenix Bridge Co.
 ALBANY, N. Y., 200 tons, buildings for State Department of Health, to Eastern Bridge & Structural Co.; reported last week as to an unnamed fabricator.
 RIVERHEAD, N. Y., 350 tons, Suffolk County Court House, to an unnamed fabricator.
 GLOUCESTER, N. J., 250 tons, highway bridge for State of New Jersey, to Phoenix Bridge Co.
 SAYRE, PA., 150 tons, high school, to McClintic-Marshall Co.
 ERIE, PA., 650 tons, Lawrence Hotel, to McClintic-Marshall Co.
 BALTIMORE, 500 tons, office building for United States Fidelity Co., to American Bridge Co.
 BIRMINGHAM, 850 tons, 16-story office building for Watts Estate, to Virginia Bridge & Iron Co.
 TALLAHASSEE, FLA., tonnage not stated, State highway bridges, to Nashville Bridge Co., Nashville.
 CLEVELAND, 18,000 tons, Cuyahoga River bridge for Cleveland Union Terminals Co., to the American Bridge Co.
 MILWAUKEE, 1600 tons, Public Safety building, to an unnamed bidder.

CHICAGO, 300 tons, glycerine plant for James S. Kirk & Co., to Midland Structural Steel Co., local.
 CHICAGO, 100 tons, hotel on Milwaukee Avenue, to Midland Structural Steel Co.
 CHICAGO, 100 tons, garage, to Midland Structural Steel Co.
 CEDAR RAPIDS, IOWA, 100 tons, building for Quaker Oats Co., to Gage Structural Steel Co., Chicago.
 KANSAS CITY, MO., 1200 tons, office building for Southwestern Bell Telephone Co., to American Bridge Co.
 TOPEKA, KAN., 600 tons, building for International Harvester Co., to Capitol Iron Works, local.
 SAN FRANCISCO, 100 tons, apartment on Greenwich Street, to Central Iron Works.
 FORT TOWNSEND, WASH., 600 tons, lumber plant, to Moore Dry Dock Co., San Francisco.

Structural Projects Pending

Inquiries for fabricated steel work include the following:

CHELTHENHAM TOWNSHIP, PA., 400 tons, school.
 CLEVELAND, 460 tons, hotel and clinic.
 CLEVELAND, 250 tons, St. Joseph Academy.
 FORT WAYNE, IND., 600 tons, building for International Harvester Co.
 BOSTON, 500 tons, Pierce Building on Broad Street.
 BOSTON, 200 tons, apartment house on Beacon Street.
 CAMBRIDGE, MASS., 500 tons, warehouse for Lever Brothers.
 PROVIDENCE, R. I., 600 tons, college building addition.
 PROVIDENCE, 350 tons, junior high school.
 NEW YORK, 7400 tons, 38-story hotel, probably at Lexington Avenue and Forty-second Street; reported last week as being in Brooklyn.
 PHILADELPHIA, 1100 tons, Jules Theater for Stanley Co.
 BALTIMORE, 800 tons, apartment building.
 FLINT, MICH., 100 tons, building for Buckingham clothing store.
 WAUWATOSA, WIS., 1500 tons, County Hospital.
 MILWAUKEE, 500 tons, Milwaukee City Hospital.
 TUCSON, ARIZ., 700 tons, office building.
 PHOENIX, ARIZ., 600 to 1000 tons, Verde pipeline; bids opened.
 PHOENIX, ARIZ., 180 tons, bridge; bids Dec. 6.
 SEATTLE, WASH., 900 tons, viaduct for Union Pacific Railroad; bids being taken.
 SAN FRANCISCO, 700 tons, addition to Medical-Dental Building; bids soon.

Canada's Iron and Steel Trade with the United States

While Canada's exports of iron and steel to the United States during the first nine months of the calendar year show a decline of some 6000 tons, as compared with the corresponding nine months of 1926, imports of iron and steel for that period show a slight increase. The Canadian exports to the United States were 57,277 gross tons, which compares with 63,368 tons for the corresponding period of last year. During the nine months Canada bought from the United States 632,031 gross tons, which compares with 631,360 tons last year.

Liberal Agreements Succeed Rigid Syndicates in Germany

HAMBURG, GERMANY, Oct. 29.—Evidently a strong feeling against syndicates and cartels is gradually developing in Germany and apparently there is a trend toward a new and less rigid type of association. Most of the existing syndicates are rigid combinations exercising control over prices, regulating production and levying fines. Although in many instances they are responsible for the stabilization of the market and a steady flow of business for their members, there are cases where these combinations of producers have not succeeded or were at least partly responsible for an unsatisfactory price policy, which ended unprofitably for the members as well as the consumers.

The growth of opposition to the syndicates is based rather on their form than on the fact of their existence, as consumers as well as producers are opposed to a return of the former disastrous competition. In consequence, the rigid type of syndicate is beginning to be succeeded by a more liberal agreement of producers,

based on mutual understanding. A few syndicates are beginning to change their structure and the more recently formed associations have definitely abandoned the former methods of regulation of production, sales and prices. It is believed in many quarters that the rigid form of syndicate will be abandoned before long, supplanted by the looser and more liberal agreement.

The Milwaukee municipal water department has been allotted \$1,050,000 for the construction of new water mains in 1928. The 1928 program calls for 45 miles of 6 to 16-in. distribution mains and the following quantities of feeder mains: 500 ft. of 54-in., 6100 ft. of 48-in., 3000 ft. of 30-in., and 8400 ft. of 20-in. R. E. Stoelting is commissioner of public works, and H. P. Bohman is superintendent of the water department.

COMING MEETINGS

December

American Society of Mechanical Engineers. Week of Dec. 5. Annual meeting, 29 West Thirty-ninth Street, New York. Calvin W. Rice, 29 West Thirty-ninth Street, New York, secretary.

National Exposition of Power and Mechanical Engineering. Week of Dec. 5. Sixth annual exposition, Grand Central Palace, New York. Charles F. Roth and Fred W. Payne, Grand Central Palace, New York, managers.

American Refractories Institute. Dec. 6 and 7. Fall meeting, Chase Hotel, St. Louis. Dorothy A. Texter, 2202 Oliver Building, Pittsburgh, secretary.

PERSONAL

Edward L. Leeds has resigned as vice-president and director of the Niles-Bement-Pond Co., New York, and vice-president of the Pratt & Whitney Co., Hartford, Conn., to devote his time to personal interests. He has been identified with the machinery industry for a number of years, having begun his engineering career with the Yale & Towne Mfg. Co., Stamford, Conn. Later he became associated with the Brown Hoisting Machinery Co., Cleveland, where he was assistant general manager, and later European manager, with headquarters in London. He has been associated with the Niles-Bement-Pond and Pratt & Whitney companies since 1906 as manager railroad department, general sales manager and vice-president.

Richard Devens, for 20 years New York manager of the Brown Hoisting Machinery Co., Cleveland, has joined the Link-Belt Co., Chicago, as sales engineer for the sale of crane products in the eastern territory. His headquarters will be the New York office, 233 Broadway.

R. W. Burk, formerly Chicago district manager for the Landis Tool Co., Waynesboro, Pa., has been placed in charge of the new factory branch office and showroom which has been opened at 5924 Second Boulevard, Detroit, by the Kearney & Trecker Corporation, Milwaukee. He will be assisted by George E. Gustafson and William Mirgeler, the former a sales engineer for the Kearney & Trecker organization who has been making his headquarters in Detroit for the last year, and the latter a direct factory representative of the company.

R. P. Nick has been transferred from the Baltimore office of the Lincoln Electric Co., Cleveland, to Lancaster, Pa., where he will be in charge of the sale of motors and welders.

Joseph Wainwright, for many years associated with Manning, Maxwell & Moore, Inc., has been added to the sales organization of the Consolidated Machine Tool Corporation of America, with headquarters at Rochester, N. Y.

Horace C. Knerr, consulting metallurgical engineer and director of the metallurgical course at Temple University, Philadelphia, addressed the Philadelphia section of the National Electric Light Association on Nov. 15, his subject being "The Alloy Age."

Joshua F. Hunter, for the past 11 years safety inspector Homestead works, Carnegie Steel Co., has been appointed general safety inspector of the company to succeed the late Adam W. Slater, with headquarters in the general offices, Pittsburgh. Mr. Hunter is a native of Philadelphia and was graduated from Lafayette College in 1906. He was in the service of the Pennsylvania Railroad from 1906 until 1916.

R. L. Balzer, for a number of years manager of the Clyde Equipment Co., Portland, Ore., resigned his position Nov. 1, to take an extended vacation, and O. B. Bjorge, chief engineer and treasurer of the company, was named as his successor.

Dr. Robert S. Williams, professor of metallography Massachusetts Institute of Technology, Cambridge, Mass., will deliver an address on "Applications of Physical Metallurgy to Industry" before the Rhode Island chapter of the American Chemical Society at Providence, Friday evening, Nov. 18.

J. A. Doyle of the W. S. Rockwell Co., New York, delivered an address before the New Haven chapter of the American Society for Steel Treating, Thursday even-

ing, Nov. 10. His subject was "Industrial Heating Operations."

C. L. Wedow, who has been connected with the sales force of the Superior Screw & Bolt Co., Cleveland, has been appointed sales manager of that company, succeeding the late William Bates.

Dr. Otto Bredt and Dr. Alexander Hirsch have formed a partnership under the name of Bredt, Hirsch & Co., with offices at 27 Ansbacher Strasse, Berlin W 50, Germany, to handle budgets, audits, sales surveys, industrial surveys, market analyses, reorganization of companies and control of sales, production and costs. Dr. Bredt, who is a doctor of engineering of the Charlottenburg Technische Hochschule, has practised as consulting engineer and efficiency expert at Munich, and spent six months of the present year in the United States, studying economic conditions and industrial methods. Dr. Hirsch, a doctor of economy of Jena University, has been manager of the Association of the Orga-Metall Co. of the Russian Government at Moscow and of the German Machine Tool Manufacturers' Association, the latter being an organization founded by him to further the development of the Russian-German machine tool trades and metal industries.

Dr. Zay Jeffries, consulting metallurgist, Cleveland, is to deliver an address Thursday evening, Nov. 17, before the New York Electrical Society in the auditorium of the Engineering Societies Building, 29 West Thirty-ninth Street, New York, on "Metals That Save Weight."

W. H. Eisenman, secretary American Society for Steel Treating, Cleveland, is concluding this week a trip by automobile through the East, which combines a vacation with visits to various chapters. By the time he returns to Cleveland next week he will have met at dinner the executive committees of 16 chapters in the eastern part of the country.

R. W. Blanchard, manager Chicago office, Hart & Cooley Mfg. Co., New Britain, Conn., has been made president of the company, succeeding J. H. Robinson, who has become chairman of the board of directors.

A. C. Higgins, treasurer Norton Co., Worcester, Mass., has been made a director of the Boston & Maine Railroad.

C. E. Hobson, Alliance, Ohio, has been appointed receiver of the Falcon Tin Plate Co., Canton, Ohio. He is a member of the creditors' committee.

C. F. Atwood and F. A. Bottome have been appointed special representatives in the New England territory for the Poldi Steel Corporation of America, 151 Bank Street, New York.

S. P. Bush, president of the Buckeye Steel Castings Co., Columbus, Ohio, has resigned and will be succeeded by J. C. Whitridge, second vice-president. C. B. Goodspeed will become second vice-president.

David F. Geissinger, for many years identified with the Somers, Fittler & Todd Co., Pittsburgh, in the sale of machine tools, has severed that connection to open an office of his own at 602 Oliver Building, Pittsburgh, and is factory representative of the Sundstrand Machine Tool Co. and Barnes Drill Co., both of Rockford, Ill.

Charles B. Francis has been appointed head of the technical bureau, Carnegie Steel Co., to succeed the late J. M. Camp. Practically all of the educational work carried on by the company for the benefit of its employees and the special chemical problems connected

with the sampling and analysis of its steel works materials are handled through this department. Mr. Francis is also associated with the chemists' committee of the United States Steel Corporation. The work of proving, standardizing and publishing the methods of the chemists of the subsidiary companies for the sampling and analysis of materials is directed by the technical bureau. As a part of the educational work of the Carnegie company, this bureau issues a book, known as "The Making, Shaping and Treating of Steel," of which Mr. Francis was co-author with Mr. Camp. Mr. Francis has served 11 years as assistant director of the bureau of technical instruction of the company, having begun work in the Steel Corporation plants in 1907, about a year after leaving the University of West Virginia. His first position was assistant chief chemist H. C. Frick Coke Co. Following this engagement, he spent about three years teaching physics and chemistry and as a consulting chemist for various smaller manufacturing concerns. In 1913 he was appointed assistant chief chemist Carnegie Steel Co. at the Clairton works, and since has served as chemist, metallurgist, teacher and writer.

L. E. L. Thomas, formerly chief engineer for the Inland Steel Co., Indiana Harbor works, has become identified with the Freyn Engineering Co., Chicago, as vice-president in charge of foreign business. After a varied construction experience in the iron and steel industry, Mr. Thomas was made chief draftsman for the Youngstown Sheet & Tube Co., Youngstown, Ohio. In 1916 he became chief engineer for the Gary Tube Co. Later he was appointed chief engineer for the United States Steel Corporation, ordnance department, which was beginning the construction of a plant for the Government for the production of large guns and projectiles. When that project was abandoned at the close of the war he resumed his former position with the Gary Tube Co., becoming chief engineer of the Inland company in 1920.

William V. Bechtold, who organized the Industrial Iron Works, Inc., Jersey City, N. J., four years ago and has been president and general manager since that time, has sold his interests in that company. Previously he was associated for 20 years with the Vulcan Iron Works, Jersey City, having been sales manager at the time of leaving it. He will represent the Catskill Foundry & Machine Works, Catskill, N. Y., and the Leslie & Elliott Boiler Works, Paterson, N. J., with headquarters at 1135 Fifth Avenue, North Bergen, N. J.

Charles M. Schwab, as president of the American Society of Mechanical Engineers, addressed the Chicago section of the society on Nov. 11. Human engineering, that is, the practice of making workmen content and happy, so that they love their work and have a personal interest in the business, is the branch of engineering to which he said he has devoted fifty years of his life in the steel industry.

Russell Wallace, former railroad executive and director, has been elected president of Crearar, Adams & Co., Thirty-sixth and Morgan Streets, Chicago, a railroad supply concern. He succeeds Edwin S. Shepard.

L. D. Bruekel, who has been assistant general manager sales strip steel department, Weirton Steel Co., has been appointed general sales manager of that department, succeeding the late Henry C. Smith.

Elbert H. Gary was eulogized by Hon. James J. Davis, Secretary of Labor, at a service in memory of Judge Gary held Sunday evening, Nov. 13, at the Madison Methodist Episcopal Church, New York, under the auspices of America's Good-Will Union. The speaker referred to Judge Gary's advocacy of good wages and to his "live and let live" policy toward competitors. Supreme Court Justice Arthur S. Tompkins presided. Remarks were also made by George K. Leet, secretary of the United States Steel Corporation, and by Judge Irving Lehman.

Organization of Steel Frame House Co. Completed

Organization of the Steel Frame House Co., Oliver Building, Pittsburgh, a subsidiary of the McClintic-Marshall Co., which was formed to take over the Broderick Steel Frame Corporation to fabricate and merchandise steel for dwellings and other similar buildings, has now been completed. E. H. Millard, president of the company, is manager of works for the Riter-Conley Mfg. Co., Leetsdale, Pa., another McClintic-Marshall subsidiary. J. C. Broderick, originator of the steel frame system which the company will use, is vice-president of the company, and E. J. Patterson, treasurer of the McClintic-Marshall Co., is treasurer of the Steel Frame House Co. In addition to these men, other directors are Robert A. McKean, general manager Riter-Conley Mfg. Co., and Robert H. McClintic, assistant manager Leetsdale works, McClintic-Marshall Co. At present fabrication of steel for steel frame dwellings will be carried on at the Leetsdale plant of the Riter-Conley company.

Taylor Society Annual Meeting

A comprehensive program has been arranged for the annual meeting of the Taylor Society, which will be held in the Engineering Societies Building, New York, Dec. 8, 9 and 10. Sessions will be held mornings, afternoons and evenings. The annual dinner, with Morris L. Cooke, consulting management engineer, Philadelphia, and president of the society, presiding, will be held on the evening of Dec. 8.

Time study as a tool of management will be discussed by Sanford E. Thompson, Thompson & Lichtner Co., Boston, at the opening session, Dec. 9. Papers for the afternoon session include: "Must Prosperity Be Planned," by H. B. Brougham, executive secretary, Pollak Foundation for Economic Research, and "High Wages and Prosperity," by H. H. Williams, general manager R. T. French Co., Philadelphia. An address on "A Platform for American Industry," by Wilfred Lewis, president Tabor Mfg. Co., Philadelphia, will feature the evening session. Papers and discussion relating to marketing will be presented at the final session of the meeting, on the morning of Dec. 10.

The fourth annual meeting of teachers of management will be held on Dec. 7, coincident with the meetings of the Taylor Society and of the American Society of Mechanical Engineers (Dec. 5-8).

Personnel Research Federation Holds Autumn Conference

Research in accident prevention, leadership as a field for scientific research, problems of the personal interview and the measurement of mechanical ability are among the subjects listed for discussion at the annual autumn conference of the Personnel Research Federation, to be held at the Hotel Pennsylvania, New York, Nov. 17 and 18.

Formal papers presented at the morning sessions will be followed by round table discussion, by groups, during the afternoon. Members will also attend a dinner meeting of the Metropolitan section of the Taylor Society on the evening of Nov. 17 at the Town Hall Club, New York. A dinner meeting, with John Mills, director of publications, Bell Telephone Laboratories, Inc., New York, presiding, has been planned for the evening of Nov. 18. Speakers at the dinner include Johnson O'Connor, General Electric Co., Schenectady, whose address will be on "Tests for Executive Salesmen and Engineers."

Alfred D. Flinn, director of the Engineering Foundation and president of the Personnel Research Federation, will preside at the first general session, and John A. Goss, vice-president of the Scovill Mfg. Co., Waterbury, Conn., at the second general session on the morning of Nov. 18. The secretary of the Federation is H. H. Carey, Western Electric Co., New York. Executive offices are at 40 West Fortieth Street, New York.

To Take Bids for Lights on New York-Atlanta Airway

WASHINGTON, Nov. 15.—Bids for installation of lights will be opened on Tuesday of next week by William P. MacCracken, Jr., Assistant Secretary of Commerce for Aeronautics, covering the last section between Greensboro, N. C., and Richmond, Va., of the New York-Atlanta airway, the survey of which recently was completed. The airway is one of the most important in the United States, serving the industrial cities of Atlanta, Spartansburg, Greensboro, Richmond, Baltimore and Philadelphia and also including Washington. The airway is 773 miles long and lighted by 80 powerful revolving airway beacons and 30 intermediate landing fields. Air mail service will be started on March 1. First class airports with facilities for refueling and repairing airplanes have been established and provided for at Atlanta, Spartansburg, Greensboro, Richmond, Washington, Philadelphia and New Brunswick.

Shipbuilders Seek Government Aid in Obtaining More Work

WASHINGTON, Nov. 15.—Representatives of the Council of American Shipbuilders conferred here last week with Postmaster General New, Secretary of the Navy Wilbur and Secretary of Commerce Hoover concerning the merchant marine and the possibility of getting more work for American shipyards. It is said that Secretary Wilbur told the shipbuilders that this depended on congressional action, the nature of which was not disclosed.

It is understood that the conference had no bearing on the suggested program of Edward N. Hurley submitted to the Shipping Board. Mr. Hurley, wartime chairman of the Shipping Board, in his comprehensive plan, took into consideration the requirements of the United States in competition with other nations for

world trade and the necessity of an adequate merchant marine both from a point of commerce and national defense. Mr. Hurley eliminates the idea of a subsidy and proposes a revolving fund of \$500,000,000 to be loaned at 2½ per cent for the construction of ships in American yards. The estimate is made that by this plan the interest charge on construction of a merchant ship would be reduced 39 per cent, resulting in a saving to the ship owner and making possible the ownership and operation of American flag vessels by private American interests. Mr. Hurley cites favorably the experience of Canada where merchant lines are owned and operated by railroads, a plan which recently was suggested to President Coolidge for American railroads.

Thomas Iron Co. Banks Mary Furnace

The Thomas Iron Co. has banked its Mary Furnace at Hokendauqua, Pa. The company states that it is its intention to take care of the trade on standard grades of foundry pig iron and remain in the market as usual, shipping from either the Mary furnace or the Keystone furnace, both furnaces using the same ore from its mines in New Jersey, which has formed part of the furnace mixture for the past 71 years.

Expansion of Metal Products Business in Los Angeles

A material gain in the value of output of machine shops and metal products plants in the Los Angeles metropolitan area during the year 1926 was registered over the previous twelve-month period, according to a survey just completed by the industrial department of the Los Angeles Chamber of Commerce. In 1925 the total value was established at \$132,671,661, while last year it ran up to \$145,890,884. Sheet metal products came to the front with a total of \$9,551,450.

OBITUARY

ARTHUR G. HENRICKS, vice-president and general manager Harnischfeger Corporation, Milwaukee, died



A. G. HENRICKS

Nov. 9 after a long illness. He suffered a nervous breakdown more than a year ago but was able to devote part of his time to business until two months ago. Mr. Henricks was born in Milwaukee on April 16, 1879, and after completing the course in the former Milwaukee Engineering School, entered the then Pawling & Harnischfeger Co. plant in its mechanical and electrical department. He was promoted successively to erecting engineer, sales engineer, general sales manager, and in 1917 was made vice-president and general manager. He was well known as an inventor, and only a short time ago perfected an electrically operated system for storing automobiles in multiple-story garages, known as the Arthen Auto Storage System, which is being manufactured by the Harnischfeger Corporation.

CHARLES F. PFISTER, a director and member of the executive committee of the Allis-Chalmers Mfg. Co., Milwaukee, died Nov. 12, as the result of a paralytic stroke which he suffered last April. He was 68 years of age and was a director of numerous banks and industrial organizations.

JOHN FRANKLIN WADE, until 1920 works manager, rolling mill department, Bristol Brass Corporation, Bristol, Conn., died suddenly at his home in that city on Nov. 7. He was born in Georgia and some 40 years ago went to Bristol and worked as a laborer in the plant of the then newly organized New Departure Bell Co. In 1896, when the company became the New Departure Mfg. Co., Mr. Wade was made superintendent. In 1904 he became superintendent in charge of production of a German subsidiary, but returned to this country in 1910. He went with the Bristol Brass Corporation in 1915. At the time of his death he was mayor of Bristol.

DR. GEORGE HILLARD BENJAMIN, well known authority on the legal aspects of engineering and applied mechanics, died on Nov. 10 at his home, 277 Park Avenue, New York. He was born in 1852 and received his university training at Union College, the Albany Medical College and the University of Frieberg in Germany, receiving his Ph. D. from the latter institution in 1882. He was editor of the National Encyclopedia of Applied Mechanics for a number of years and also served as assistant editor of Appleton's Encyclopedia of Applied Mechanics. Dr. Benjamin was also well versed in corporation law and assisted in the formation of the General Electric Co. and the General Railway Signal Co.

HARRY A. COFFMAN, vice-president and sales manager of the Hart Grain Weigher Co., Peoria, Ill., died suddenly in the LaSalle Hotel, Chicago, on Nov. 3, aged 47 years. He was born at Champaign, Ill., and after graduation from the University of Illinois joined his father in the implement business. He located in Peoria in 1908 and was associated with Luthy & Co., dealers in farm implements. Two years later he joined the Hart organization and was closely associated with A. J. Hartley in the development of the business.

ALONZO G. KINYON, consulting engineer for the Fuller Lehigh Co., Fullerton, Pa., died on Nov. 13 in the Johns Hopkins Hospital, Baltimore, aged 57 years. He was an inventor of conveying equipment for cement mills.

Prices Firmer in European Markets

Great Britain, Belgium and France Show Improvement—German Wage Increase Asked—Tin Plate Demand Better

(By Cable)

LONDON, ENGLAND, Nov. 14.

PIG iron is quieter but Cleveland prices are firm with makers well booked for their limited output, which they apparently do not intend to increase at present. Welsh consumers have purchased moderate tonnages of East Coast hematite and there have been some sales for export, but competition is keen and makers are granting concessions on large orders. Foreign ore is dull.

Finished steel demand has improved slightly as a result of increased shipbuilding and some domestic rail contracts. Export is still quiet and consumers are expecting lower prices.

October exports of pig iron were 26,145 gross tons, of which the United States received 185 tons. Total exports of iron and steel were 384,784 gross tons.

Tin plate demand is increasing and some good sales

have been effected in both the domestic and export markets. Consumers are anxious to cover their requirements as output is to be restricted by some mills closing for three weeks over a period of 13 weeks beginning Nov. 28. Most makers have agreed not to sell below 17s. 9d. (\$4.31) per base box, f.o.b. works port. Some mills have already obtained as much as 18s. (\$4.37) per base box.

Galvanized sheets are weak and demand is poor, especially from India, and makers are reducing output. Black sheets No. 24 gage are dull, but there have been moderate merchant sales of Japanese specifications.

Continental markets have developed a firmer tendency although without a substantial increase in the volume of business. The situation is rather complex but the firmer attitude of Continental works is believed to be the result of cartel discussions. Columeta has secured an order for 23 kilometers of rails for Japan.

FRENCH BUSINESS IMPROVED

Prices Stronger Although Demand Is Still Light—Dutch Experiment with Minette Ore

PARIS, FRANCE, Nov. 4.—Purchasing is only for replacements with orders as a rule small and covering a wide range of specifications. The general tendency of prices, however, is toward firmness and both domestic and export quotations are steadier than for some time. In the export field, the belief that prices will advance when the separate selling syndicates for semi-finished material and beams are established has apparently stimulated some buyers. Domestic purchasing has been considerably smaller than export, and many mills are still in need of tonnage to permit a return to full time operation.

Pig Iron.—There is a slight improvement in domestic purchasing but export business is light, particularly sales to British consumers of foundry iron. This is probably because of the price, the British offering up to £2 17s. (\$13.85) per ton, while furnaces are seldom

willing to accept orders at less than £2 19s. (\$14.34) per ton, f.o.b. Antwerp. Production is decreasing slightly. Exports of pig iron to the United States continue small. Of 60,797 metric tons exported in September only 508 tons went to American consumers, and of 652,594 tons exported in the first nine months of this year only 2468 tons went to the United States. Consumption of iron ore domestically has decreased, but exports to Germany have increased and are steady to Belgium. A few months ago several cargoes of "minette" ores were shipped to Holland, but the Dutch plan to use these ores instead of Swedish is understood to have been abandoned. Prices range from 30 to 33 fr. (\$1.18 to \$1.30) per ton for either domestic or export shipment.

Semi-Finished Material.—Demand for export is irregular, but prices are showing slightly more steadiness than formerly. Blooms are quiet, but sheet bars are showing some activity. Quotations range from £3 18s. to £4 1s. (\$18.95 to \$19.68) per ton on blooms and on billets from £4 3s. to £4 5s. (\$20.17 to \$20.65) per ton. Sheet bars have advanced about 6d. per ton to £4 6s. to £4 6s. 6d. (\$20.90 to \$21.02), all f.o.b. Antwerp.

Finished Material.—Improvement in demand is more

British and Continental European prices per gross ton, except where otherwise stated, f.o.b. makers' works, with American equivalent figured at \$4.86 per £ as follows:

Durham coke, del'd.	£0 18s.		\$4.37	
Bilbao Rubio ore†	1 1	to £1 1½s.	5.10	to \$5.16
Cleveland No. 1 fdy.	3 10½	to 3 12½	17.13*	to 17.62*
Cleveland No. 3 fdy.	3 7½		16.40*	
Cleveland No. 4 fdy.	3 6½		16.16*	
Cleveland No. 4 forge	3 6		16.04*	
Cleveland basic (nom.)	3 15	to 3 15½	18.23	to 18.35
East Coast mixed	3 10	to 3 12	17.01	to 17.50
East Coast hematite	3 12½		17.62	
Rails, 60 lb. and up.	7 15	to 8 0	37.67	to 38.88
Billets	6 0	to 6 10	29.16	to 31.59
Ferromanganese	13 0		63.18	
Ferromanganese (export)	11 10	to 12 0	55.89	to 58.32
Sheet and tin plate bars, Welsh	5 7½	to 5 15	26.12	to 27.95
Tin plate, base box	0 17¾	to 0 18¾	4.31	to 4.43
Black sheets, Japanese specifications.	13 5	to 13 10	64.40	to 65.61
Ship plates	7 12½	to 8 2½	1.65	to 1.76
Boiler plates	10 10	to 11 0	2.28	to 2.39
Tees	8 2½	to 8 12½	1.76	to 1.87
Channels	7 7½	to 7 17½	1.60	to 1.70
Beams	7 2½	to 7 12½	1.55	to 1.65
Round bars, ¾ to 3 in.	7 12½	to 8 2½	1.65	to 1.76
Steel hoops	10 10	to 11 0	2.28	to 2.39
Black sheets, 24 gage	10 5	to 10 10	2.22	to 2.28
Galv. sheets, 24 gage	13 7½	to 13 10	2.90	to 2.93
Cold rolled steel strip 20 gage, nom.	14 0	to 14 5	3.03	to 3.09

*Export price, 2½s. less for 500 tons or more.
†Ex-ship, Tees, nominal.

Continental Prices, All F.O.B. Channel Ports

(Per Metric Ton)

Foundry pig iron: (a)				
Belgium	£3 0s.	to £3 1s.	\$14.58	to \$14.82
France	3 0	to 3 1	14.58	to 14.82
Luxemburg	3 0	to 3 1	14.58	to 14.82
Basic pig iron:				
Belgium	2 18	to 3 0	14.09	to 14.58
France	2 18	to 3 0	14.09	to 14.58
Luxemburg	2 18	to 3 0	14.09	to 14.58
Coke	0 18		4.37	
Billets:				
Belgium	4 3	to 4 5	20.17	to 20.66
France	4 3	to 4 5	20.17	to 20.66
Merchant bars:				
Belgium	4 15	to 4 16	1.05	to 1.06
France	4 15	to 4 16	1.05	to 1.06
Luxemburg	4 15	to 4 16	1.05	to 1.06
Joists (beams):				
Belgium	4 10	to 4 12	0.99	to 1.02
France	4 10	to 4 12	0.99	to 1.02
Luxemburg	4 10	to 4 12	0.99	to 1.02
Angles:				
Belgium	4 13		1.03	
½-in. plates:				
Belgium (a)	6 5	to 6 6	1.38	to 1.39
Germany (a)	6 5	to 6 6	1.38	to 1.39
¾-in. ship plates:				
Belgium	6 0	to 6 1	1.32	to 1.33
Luxemburg	6 0	to 6 1	1.32	to 1.33
Sheets, heavy:				
Belgium	6 1		1.33	
Germany	6 1		1.33	

(a) Nominal.

evident in the merchant market. The recent low prices that appeared when some jobbers were reducing their stocks have disappeared and the market is generally stronger. Export business is uneven but prices are fairly firm. Beams continue at £4 7s. to £4 9s. 6d. per ton (0.96c. to 0.99c. per lb.), reinforcing bars at £4 12s. 6d. to £4 13s. per ton (1.02c. to 1.03c. per lb.) and plain steel bars at £4 14s. to £4 15s. per ton (1.04c. to 1.05c. per lb.) There is no change in prices for heavy and medium gage sheets, but light gages having steadily declined to a low level, consumers have begun building up stocks and prices are showing a tendency to advance. Of total exports of 217,758 tons of semi-finished material, beams and bars in September, 6270 tons went to the United States. Rail exports in September totaled 43,847 tons, of which Germany took 11,034 tons; Argentina, 3308 tons; Brazil, 2673 tons; Italy, 2200 tons; Holland, 2187 tons; Great Britain, 2029 tons; Morocco, 1331 tons; Japan, 1217 tons, and other countries, 1337 tons. As these statistics are about double the reports of exports by the National Rail Comptoir and the European Rail Makers' Association, there is probably a large tonnage of old rails included, which are shipped as rails rather than scrap, the latter being regulated at export by the Government. While total rail exports for the first nine months were 300,758 metric tons, producers in France estimate the actual exports of new rails at about half this tonnage.

DEMAND HIGHER WAGES

Home Trade Still Good—Bar and Plate Demand Active but Wire Rods and Wire Products Quieter

BERLIN, GERMANY, Oct. 27.—Domestic market conditions are still highly satisfactory and the predicted reaction in business has not yet appeared. In some minor industrial fields there is a slight increase of unemployment, but the iron, steel and machinery business is unaffected. There is active agitation for higher wages, although official figures show a slight decline in the cost of living since July. The price index for manufactured goods is the highest on record. This and the recent action of the Government in raising all official salaries has caused a general demand for higher wages. There has been but little movement of wages in the past year or more. Based on the average weekly wage for skilled workers in 12 industries the average was 38.78 m. (\$9.23) in January, 1925, 45.98 m. (\$10.95) in January, 1926, and 46.26 m. (\$11.01) in January, 1927. In September the average was 49.02 m. (\$11.67). The average weekly wage of skilled workers in the metal working industries is 48.32 m. (\$11.50), a little lower than the average for the 12 industries.

Recently the lignite miners, as a result of a strike, obtained a wage increase of 11.50 per cent, but the demand by coal miners for an advance in wages has thus far been rejected. Operators in both the lignite and coal fields are urging the Federal Coal Council for permission to increase prices.

Production Well Maintained

Iron and steel production in September was well maintained, the few declines reported in certain products resulting from the reduced number of working days. The number of blast furnaces in operation in September was 114 and the output was 1,104,653 metric tons, compared with 880,025 tons in September last year. Steel ingot production totaled 1,371,364 tons, compared with 1,143,578 tons in September, 1926, and the output of rolled products was 1,122,130 tons, compared with 948,552 tons in September, last year.

Domestic prices of the pig iron syndicate for November continue unchanged. There is an evident tendency to increase domestic prices of manufactured articles as a result of the continued heavy demand. Thin sheet prices, which are not controlled by a syndicate, show an irregular tendency and competition among makers is keen.

Belgian members of the International Wire Syndicate have signified their intention of withdrawing, but

as the syndicate has thus far operated satisfactorily, the expectation is that it will be renewed. Criticism is again being directed by the German press at the International Steel Cartel. Although the penalty for over-production which is consumed domestically has twice been reduced, first from \$4 to \$2 per ton and more lately to \$1 per ton, it is pointed out that Germany will continue to be heavily penalized whenever mills are compelled to increase their steel exports. The entire \$4 per ton fine is still effective on such over-quota production as is exported. Penalties paid by Germany on over-quota production during the first year of the cartel's existence, which ended September 30, total \$11,000,000.

Mills Have Good Order Books

There is no evidence of a decline in the volume of orders being booked by steel mills, and most rolling mills have more orders than their quotas permit. Orders taken for semi-finished material have filled producers to the end of the year. Decline in building activity has reduced business in structural steel, but the bar market is unusually active. In some cases delivery terms on bars range up to five months. The United Steel Works and other leading producers are quoting eight to 10 weeks delivery, and the delivery terms of the South German mills have also lengthened. Demand for heavy sheets is good with plenty of business coming from the shipyards, but mills rolling medium and light gage sheets complain of a lack of orders. Business in the wire consuming industries has slightly declined and exports of wire products have lately been smaller. Production of wire rods, which reached a maximum in March, has been smaller in recent months.

Business in the Solingen district among cutlery makers is greatly improved and only about 600 unemployed are reported from the district. As a result of an enforced 8 per cent increase in wages, domestic prices have been advanced an average of 10 per cent. Export has increased as a result of the Christmas demand, and there have been some large British, Scandinavian and Dutch orders. Exports to France have not been materially increased by the reduction of the French tariff under the commercial treaty. The demand for rust-resisting cutlery is increasing at prices about double those for ordinary steel.

BELGIAN TRADE BETTER

Mills Well Booked and Maintaining Prices—Pig Iron Prices Still Weak

ANTWERP, BELGIUM, Nov. 1.—The volume of purchasing during October was larger than in previous months and a number of mills have been able to obtain sufficient tonnage to maintain a good rate of operation. As a result prices show more stability and the market generally has a favorable appearance. A few large producers are temporarily out of the market and others are offering delayed deliveries. There are a few instances of slight increases in prices, but buyers are showing some resistance to a higher level. Other favorable factors are the reduction of French and Luxembourg competition and additional strength in the German prices for export.

Pig Iron.—Unlike the steel market, pig iron prices still show an undercurrent of weakness. The reduction of prices, effective in October, developed no increase of purchasing. Export business is decidedly small. Phosphoric foundry iron is quoted at £2 19s. to £3 (\$14.34 to \$14.58) per metric ton, f.o.b. Antwerp, for export.

Semi-Finished Material.—Sheet bars are in moderate demand with quotations ranging from £4 6s. 6d. to £4 7s. (\$21.02 to \$21.14) per ton, f.o.b. Antwerp. Blooms and billets, however, are inactive. Billets are quoted at £4 3s. 6d. to £4 5s. (\$20.29 to \$20.66) per ton, depending upon the specification, and blooms at £3 18s. (\$18.95) per ton for 4-in. and £4 (\$19.44) per ton for 6-in. blooms.

Finished Material.—There is a stronger tendency to prices than has been evident for some time, purchases in the past month having placed most mills in a more independent position. Deliveries of 10 to 12 weeks are generally offered and sellers show no inclination to con-

sider counter offers of lower prices from consumers. Export buyers hesitate to pay the present prices, but makers show no inclination to consider concessions to obtain business. As there has been a similar improvement in other European producing countries, Belgian mills will apparently be able to maintain their present position. While £4 14s. per ton (1.04c. per lb.) is still obtainable on steel bars, it is becoming less common, makers asking £4 15s. to £4 15s. 6d. per ton (1.05c. per lb.). Shapes are quoted at £4 13s. to £4 14s. per ton (1.03c. to 1.04c. per lb.). Beams as yet show no tendency toward improvement and prices are still weak at £4 8s. per ton (0.97c. per lb.). Reinforcing bars are held at about £5 per ton (1.10c. per lb.), f.o.b. Antwerp, and hoops at £5 7s. 6d. per ton (1.19c. per lb.). Sheet mills are still seeking tonnage, but in most cases there is no shading to obtain business.

British Pig Iron and Steel Output in October

LONDON, ENGLAND, Nov. 14 (*By Cable*).—October pig iron production was 596,300 gross tons and that of steel ingots was 699,000 tons. These compare with the September output of 591,500 tons of pig iron and 777,000 tons of steel.

The comparison of this year's output with the monthly production in recent years is shown by the following table in gross tons:

	Pig Iron, Tons	Steel Ingots, and Castings, Tons
1913—Average monthly.....	855,000	638,600
1920—Average monthly.....	669,500	755,600
1922—Average monthly.....	408,500	490,100
1923—Average monthly.....	620,000	706,800
1924—Average monthly.....	609,900	685,100
1925—Average monthly.....	519,700	616,400
1926—Average monthly.....	203,500	296,700
1927—First quarter per mo....	559,100	835,700
1927—Second quarter, per mo.	683,500	826,600
1927—Third quarter, per mo.	611,100	701,500
1927—October	596,300	699,000

International Wire Rod Cartel Controls Prices

HAMBURG, GERMANY, Oct. 29.—The International Wire Rod Cartel has finally been formed, the agreement which includes German, French, Belgian and Luxembourg mills having been signed recently at Aachen. The present contract is to be effective for six months, but if not cancelled by the members at the end of four months, it is automatically renewed for a year. Under the agreement the price of wire rods is fixed for export at £5 10s. (\$26.73) per metric ton, f.o.b. Antwerp for 1000 tons or more and at £5 12s. 6d. (\$27.34) per ton, Antwerp for smaller tonnages. A penalty of \$250 has been fixed for underselling. The cartel became operative at once.

Russian Bridge Engineers Visit This Country

A delegation of Soviet bridge builders, headed by Prof. V. P. Nikolaev, manager of the bridge building section of the Metal Administration of the Soviet Union, has arrived in the United States for a study of American bridge building, according to a recent announcement of the Amtorg Trading Corporation, 165 Broadway, New York. The delegation, consisting, besides Professor Nikolaev, of B. P. Knoppe and S. F. Turuntaev, expects to stay in the United States two months.

In regard to the visit, Professor Nikolaev said: "Within the next five years it will be necessary to reconstruct at least 50 per cent of the railroad bridges in the whole of the Soviet Union. Our existing structural iron works, although up to their pre-war capacity, cannot produce enough parts for these new bridges. Therefore, the Government has decided to build two new bridge plants, one in the Donetz Basin and another in the Urals. Each of these plants will have an annual capacity of 60,000 tons of metal shapes, aside from other structural materials. We expect to visit many bridge works in Pittsburgh, Chicago, Gary, Ind., and Bethlehem, Pa. We shall also study the equipment market in this country."

JAPAN BUYS GAS PIPE

Two Gas Companies Place Orders Here—Importers in United States Bring in Hoops

NEW YORK, Nov. 15.—Export business continues small, despite low quotations occasionally made on tonnages of bars, shapes and plates to South American markets and the Far East. A recent inquiry from Shanghai, China, called for about 2000 tons of tank plates, but the American bid was about \$10 per ton higher than Continental prices.

Merchant buying in the Far Eastern markets continues light, but there have been some fair purchases of pipe recently by large consumers in Japan. In addition to the heavy tonnage placed by the Tokio Gas Co. a few weeks ago, the Toho Gas Co. has closed on about 400 tons of small sized gas pipe and the Japanese Navy has purchased about 400 tons of 4-in., 6-in. and 8-in. steel pipe for an arsenal. Both orders went to large American makers. Yokohama municipality has awarded about 650 tons of 143-lb. guard rails to a Japanese export house in New York. Among current inquiries from Japan are some small lots of tin plate ranging from 500 to 1000 base boxes each. Tin plate export prices continue low with \$5.35 to \$5.40 per base box, c.i.f. Japan, fairly representative of the current market.

Imports of European steel for American consumers are still confined to small lots of hoops and occasional purchases of steel bars and shapes. In the past week, an order for about 2500 tons of plain steel bars is reported to have been placed with an importer in New York for shipment to Texas. Prices continue at 1.65c. to 1.70c. per lb. base on plain steel bars and 1.55c. to 1.60c. per lb. base for structural material, c.i.f. Atlantic port. Hoops are quoted at 2.00c. per lb. and slightly less, c.i.f. Atlantic port.

German Shipbuilders Have Large Foreign Contracts

HAMBURG, GERMANY, Oct. 29.—German shipbuilders have been successful in booking some large orders from abroad, most of them in the past month. Among these are two large motor ships of 11,000 tons each placed by the British line, Furness White & Co., with the Deutsche Werke Kiel, which also took contracts for three more ships from British companies. Swedish and Norwegian shipping companies have contracted for a total of 22,000 tons and Denmark 16,000 tons of ships. There have also been some small contracts taken by German shipyards from Spain, Yugoslavia, Argentina and Brazil, including large orders for dredges. October was the best month in shipbuilding for several years. Companies in Holland have a total of 27,000 tons of motor vessels under order with German builders.

German Institute Develops Ultra-Thin Sheet

HAMBURG, GERMANY, Oct. 29.—The Physical and Technical Institute at Berlin, under the direction of Dr. Muller, has entered into the production on a large scale of thin steel and non-ferrous sheets. These sheets have an absolutely smooth surface and are so thin as to be translucent. It is said that tests show that these sheets will find a wide field of usefulness in medicine, physics and microscopy. The coming year's production has been sold, the German Dye Corporation having taken half the output for uses which it is developing. The British Bureau of Standards purchased 600 large sheets, and various possible consumers of the product are showing great interest. It is claimed that the sheets will bend and fold better than paper.

The Federal Trade Commission has issued a pamphlet entitled "Trade Practice Conferences," showing what has taken place during the past six years in settling disputes arising from unfair methods in business competition.

Open-Hearth Discussion at Detroit

(Concluded from page 1379)

ner in the iron of which the mold is made, but it is the combination of these elements which tells the story. Neither basic, Bessemer, foundry nor malleable iron is the required material. What is used in modern plants is called "ingot mold" iron. Sulphur is held below 0.05 per cent and has little influence on the life of the mold, if it is below that point. It must be as low as that because the molds are charged as scrap after being worn out. Phosphorus is not injurious up to 0.20 per cent, while excellent results are obtained up to half that proportion. Some good molds have had as high as 0.185 per cent of sulphur. Manganese is held between 0.60 and 1.60 per cent, and silicon between 1.20 and 2.30 per cent, good results being obtained anywhere within those ranges.

It was pointed out by a blast furnace man that the iron may be governed fairly closely in the furnace. He recommended using Bessemer or equivalent for molds, and having it hot enough so that it could be held 6 to 10 hr. in a 70-ton ladle and still pour clean. Present specifications for mold iron have been held for five or six years, said one speaker. In general, the requirement is for about 1 per cent manganese, 1.6 per cent silicon, 0.10 per cent or less phosphorus and low sulphur.

Making of molds is a dry sand manufacturing operation, and drying the mold, both cheek and core, is most important. For even thickness of mold walls, jig fixtures are used in assembling. The temperature of pouring is important. If melted in a cupola at as high a temperature as possible, to get out the impurities, the iron should be allowed to stand in the ladle until it reaches a proper pouring temperature.

Mold Life Reports

Small molds fail by local burning out, producing a rough surface, while large molds are more apt to fail by cracking, according to Howard McClelland. By using care in operation and a good design, good mold practice was reported by J. M. Hughes. These molds are used on a 6 to 8-hr. rotation and seldom develop cracks. Molds can be ruined by pouring ingots too hot or too cold. It is hard on the mold to leave the ingot in for more than 60 or 90 minutes. Forging steel ingots are left in for 75 min. at the Donner plant, while the molds are poured on a 12-hr. schedule. At the Lackawanna plant the schedule is only 4 hr. in some cases, but Mr. Denlinger believes that this may injure the mold. He attempts, however, to avoid the use of a real cold mold.

A much longer period is allowed at the Ashland works, where Mr. McCutcheon reported a 16-hr. inter-

val for slab molds, which are stripped about 60 min. after pouring. The molds are then laid on their sides to be cleaned, then set on graphited stools and sprayed. The stool helps keep the mold warm. One batch of molds here was poured five times in a day, and another batch once a day for comparative tests. Fire cracking developed sooner with the hot molds.

At the Atlantic Steel Co., the large ingots are held in the mold for 6 to 8 hr., while the smaller are stripped in one hour. The big ones are 16 x 42-in. slab ingots and the molds develop considerable cracking.

Proper pouring cycles have as much to do as anything with the mold life, in the opinion of G. D. Tranter. His molds at Middletown are run on a 6 to 8-hr. cycle. Leaving the ingot in the mold beyond a certain time decreases the life of the mold but, up to 2 hr., this effect is not noted. If the stream from the nozzle strikes the side of the mold it is apt to gouge it. Rough handling and knocking the molds over do them no good. Much depends, therefore, upon the judgment of the stripper operator. Practice at this plant is 91 to 95 heats to the mold.

Open-Hearth Questionnaire

A strong plea was made by the chairman for complete and prompt filling out of the questions asked regarding furnace design. The United States Steel Corporation rates its furnaces at 1 ton of ingots a day for each 8 sq. ft. of bath area. Present conditions, however, with the forcing which furnaces have had in recent years, put this figure nearer 5½ sq. ft. This is the figure used in the questionnaire for furnace rating. On this basis there would be an output of 100 tons from a furnace which the corporation rates at 70 tons.

Technical advantages to the plants of the United States Steel Corporation have resulted from their interchange of information and data. This, said J. V. W. Reynders, was a primary reason for starting this series of meetings of independent companies. Already the independent companies have gone a long way toward overcoming the disadvantage under which they previously were working. This may be gaged not only from the reports and discussions which have been given voice in the six meetings so far held, but also from the personal contacts of the men with each other at these meetings and the continuing contacts between meetings, either by correspondence or otherwise. Thus, the information to be derived from the meetings appears to be growing in importance and in benefit.

Changes in Metal Schedules of Cuban Tariff

WASHINGTON, Nov. 15.—Details regarding the new Cuban tariff, effective Oct. 26, have been made available at the Division of Foreign Tariffs, Department of Commerce. In the iron and steel schedule the duty on rails is considerably decreased. Galvanized sheets are slightly increased; the duty on structural shapes remains practically the same, but in the case of those not fabricated or cut to measure, the duty is lowered to one-fifth of that previously in effect.

The principle prevailing through the iron and steel schedule is the reduction of duty on raw materials and increase in finished products to encourage domestic industry. The same criterion has been followed in the case of copper and its alloys. In the machinery schedule, as previously stated, a small increase is made on machinery for manufacturing sugar and sugar-alcohol, and unspecified agricultural machinery with copper or copper alloys as the material of chief value.

However, machinery and parts ordered from factories prior to Oct. 26 are not subject to the increased

duties, provided the contracts are presented as proof within two months from Oct. 20.

Discuss Mechanical Cupola Charging at Boston

Mechanical cupola charging was the chief topic of discussion at the November meeting of the New England Foundrymen's Association on Wednesday evening, Nov. 9, at the Exchange Club, Boston. Charles A. Roberts, general superintendent Gurney Heater Mfg. Co., Framingham, Mass., described, with the help of pictures, material handling at his plant, not only at the cupolas, but in the yard as well. R. T. Turner, secretary Shepard Electric Crane & Hoist Co., showed several illustrations of material handling installations.

H. S. Chaffee, Builders Iron Foundry, Providence, R. I., president of the association, presided. He appointed Charles A. Reed, Rogers Brown & Crocker Bros., Inc., chairman of the entertainment committee for the association's annual dinner to be held in January.

Machinery Markets and News of the Works

CONDITIONS SPOTTY

Some Improvement in Machine Tool Buying at Chicago and Cleveland

Elsewhere the Activity Is of Less Proportions Than in October and Prospects Are Somewhat Indefinite

THE general view in the machine tool trade is that November buying will not equal that of October, but there has been a degree of encouragement from spurts of activity at Chicago and Cleveland in the past week. October orders slightly exceeded those of September, according to a report of the National Machine Tool Builders' Association, but were only 60 per cent of the business done in October, 1926. The association's survey of conditions says that the equipment industries are going along on about the average level of 1923-24-25, which in the present state of general business is "about as good as can be expected."

Cincinnati reports that machine tool business in the first half of November showed a recession. Definite action on a considerable number of outstanding quotations is not expected before early in the new year. At Cleveland the outlook is regarded as a little brighter, while Chicago sales are bringing this month in line with last.

The Nash Motors Co. has placed at Chicago a part of its tool requirements for an expansion program at Racine, Wis., and there has been miscellaneous buying by the International Harvester Co., Deere & Co. and two or three railroads. At Cleveland the U. S. Aluminum Co. has bought tools for its permanent mold foundry. A motor company bought six die sinking machines. In the East the largest project is the expansion program in the refrigeration department of General Electric Co., which requires a number of tools.

Flood conditions in New England have interrupted operations at a good many metalworking plants, but the damage has not been serious. No inquiries of importance have resulted from injury to tools or other shop equipment.

New York

NEW YORK, Nov. 15.

MACHINE tool buying is of moderate proportions. The first half of the month did not equal the October rate of purchasing in this district. The most active project of size is the expansion of facilities in the refrigeration department of General Electric Co., Schenectady, N. Y., which calls for the purchase of a number of new tools. Among the week's purchases were the following: Six No. 3 die sinking machines by an automobile company; a 13 x 30-in. lathe by a company in California; a 13 x 30-in. lathe by Yale University; a 36 x 40-in. side-head boring mill by a manufacturer at Pottstown, Pa.; a Ramson grinding machine by a Chicago company; a 5-ft. radial drill by a chemical manufacturer in New Jersey; a used Pratt & Whitney turret lathe by a Philadelphia company; two Cincinnati high-speed tapping machines by an Indiana electrical manufacturer.

The Meyer-Sniffen Co., 542 West Twenty-seventh Street, New York, manufacturer of plumbing equipment and fixtures, has leased a portion of the new building at 200 Varick Street, totaling about 25,000 sq. ft. and will remove its present business to this location at an early date.

The Bureau of Supplies and Accounts, Navy Department, Washington, is asking bids until Nov. 22 for a coal-handling system for the New York Navy Yard, schedule 8010; also for one motor-driven hoist, single drum, for the aircraft station at Lakehurst, N. J., schedule 8065.

Joseph Orlando, 645 East Tremont Avenue, New York, architect, has completed plans for a new two-story automobile service, repair and garage building, to cost approximately \$150,000 with equipment.

Bennett & Koepfel, 7826 Fifth Avenue, Brooklyn, architects, have plans for a two-story automobile service, repair and garage building, to cost close to \$100,000 with equipment.

The New York Edison Co., Irving Place and Fifteenth Street, New York, is completing plans for a one-story and basement steam turbo-generator electric power plant at 701-27 East Fourteenth Street, corner Avenue C, 206 x 237 ft., to cost approximately \$3,000,000 with equipment. Thomas E. Murray, Inc., 55 Duane Street, is engineer. The company

has plans also for a four-story electric power substation at 311 West Thirty-fifth Street, to cost about \$125,000 with machinery. W. Whitehill, 709 Sixth Avenue, is architect for the last noted structure.

The Joseph Wiggins Coal Co., East 141st. Street and the Harlem River, New York, has leased additional property, 50 x 275 ft., for new coal pockets, with conveying, loading and other mechanical facilities.

The Gryphon Rubber & Tire Corporation, Bailey Avenue and 192nd. Street, New York, is offering its plant for sale, with total of 66,000 sq. ft. of manufacturing space, power house, etc.

The Magazine Repeating Razor Co., 285 Madison Avenue, New York, manufacturer of razors and blades, is arranging for an increase of 15,000 shares of preferred stock, and 100,000 shares of deferred stock in present capitalization, a portion of the fund to be used for expansion. Walter B. Lashar, president of the American Chain Co., Bridgeport, Conn., and affiliated interests are securing a substantial holding in the company, and will be active in the development, including production of a new steel for razor blade manufacture, to be owned exclusively by the company.

William F. Doyle, 11 John Street, New York, architect, has plans for a one and three-story automobile service, repair and garage building, to cost approximately \$200,000 with equipment.

The Long Island Railroad Co., Pennsylvania Station, New York, is said to be arranging a fund of about \$57,000,000, to be used during the next five years for expansion and betterments, including additional rolling stock, new yards and shops with tools and equipment, and the electrification of its freight service lines in New York. A new terminal is also projected at Long Island City.

Jenson & Mitchell, Hoyt Street and Sussex Avenue, Newark, manufacturers of automobile springs and kindred automotive accessories, have acquired the one-story building, 90 x 110 ft., at 396 New Street, heretofore occupied by the LeBlond-Schacht Motor Truck Co. as a general service and repair plant, and will establish a new plant at this location. The LeBlond-Schacht organization has leased space in the building on Providence Street, between Fleming and Passaic Avenues, totalling about 10,000 sq. ft. of floor space.

The Kruesheid Electric & Mfg. Co., 39 Barbara Street, Newark, manufacturer of electrical equipment, will purchase a new two-story factory at Irvington, 100 x 100 ft., aggregating close to 20,000 sq. ft. of floor space, now being completed, for the establishment of a new plant.

The Eastern New Jersey Power Co., 601 Bangs Avenue, Asbury Park, N. J., has plans for a new two-story equipment storage and distributing plant at Allenhurst, N. J., to cost approximately \$100,000 with mechanical facilities.

The Essex County Board of Vocational Education, 969 Broad Street, Newark, has plans for a two-story vocational school for boys at Bloomfield, N. J., to cost approximately \$75,000. Guilbert & Betelle, 24 Branford Place, Newark, are architects.

The Western Electric Co., 195 Broadway, New York, has awarded a general contract to Henry Steers, Inc., Tube Concourse Building, Jersey City, N. J., for a new one-story unit at its plant at Kearny, N. J., to be 97 x 350 ft., and to cost in excess of \$200,000 with equipment.

The Minnisink Oil Co., Inc., Whippany, N. J., affiliated with the Sun Oil Co., Finance Building, Philadelphia, has acquired property, 100 x 250 ft., on the Mount Pleasant Turnpike, for a storage and distributing plant, to cost upward of \$50,000 with equipment.

The Olson Die & Mfg. Corporation, 63-65 Twenty-fifth Street, Guttenberg, N. J., has been organized to manufacture tools and dies, specializing in die casting dies, and will also do metal stamping. A plant is in operation and all machinery has been purchased.

The H. P. Preis Co., Inc., importer and exporter of engraving and die cutting machinery, has moved from 9-13 Campbell Street, Newark, to 227-229 Fulton Street, New York.

The Hydraulic Steel Baling Co., Inc., Noble Street and Meeker Avenue, Newark, has been organized to bale iron and steel scrap from dealers and factories in the immediate vicinity and will sell direct to iron and steel mills.

The Parker-Kalon Corporation, 352-362 West Thirteenth Street, New York, manufacturer of hardware and sheet metal workers' specialties, will remove its factory and general offices to a new building at 200 Varick Street, effective Dec. 1, and will occupy the fifth and sixth floors.

The George Bender Co., formerly at 122-130 Centre Street, New York, dealer in electric motors and dynamos, has purchased its own building at 88 White Street, New York.

The F. A. Calhoun Co., furnace engineer, Lincoln Trust Building, Jersey City, N. J., is interested in securing printed matter and data on Diesel engines, ore crushers, conveyors and other equipment used in the erection of a lead ore smelting plant.

Philadelphia

PHILADELPHIA, Nov. 14.

THE York Ice Machinery Corporation, Belmont Avenue and Thompson Street, Philadelphia, manufacturer of ice and refrigerating machinery, with headquarters at York, Pa., has taken bids for extensions and improvements in its plant, to cost upward of \$50,000 with equipment.

The Board of Education, Nineteenth Street, Philadelphia, has taken bids on a general contract for the first eight units of the new Thomas Shallcross school for boys at Byberry, Pa., to cost close to \$2,000,000 with equipment. Superstructure is under way on a new boys' trade and vocational school at Frankford Avenue and Clementine Street, to cost approximately \$100,000. Irwin T. Catharine is architect.

The F. J. Stokes Machine Co., Tabor Road, Philadelphia, manufacturer of textile machinery and parts, has filed plans for a new building to cost about \$36,000.

The Board of City Commissioners, Wildwood, N. J., plans the installation of pumping machinery and auxiliary power equipment in connection with extensions and improvements in the municipal waterworks. A fund of \$50,000 has been authorized for the work.

The Board of Education, Mays Landing, N. J., plans the installation of manual training equipment in a new three-story and basement high school, to cost close to \$300,000 with equipment, for which superstructure will soon begin. S. Hudson Vaughn, Guarantee Trust Building, Atlantic City, N. J., is architect.

Alfred Chambers, 115 Orange Street, Wilmington, Del., is considering rebuilding the portion of his automobile service, repair and garage building, destroyed by fire Nov. 2, with total loss reported at \$75,000.

The William Cramp & Sons Ship & Engine Building Co., Philadelphia, has closed negotiations for the sale of its drydock and ship repair plant, heretofore known as the Kensington Shipyard, to a company whose name is temporarily withheld. The new owner will take possession soon and plans to resume operations for shipbuilding and repair.

The Pennsylvania Railroad Co., Philadelphia, has authorized plans for a new storage and distributing building at Thirty-first and Walnut Streets, exclusively for automobiles, and will begin work soon. It is reported to cost more than \$75,000 with equipment.

The Carlisle Tire & Rubber Co., Carlisle, Pa., has awarded a general contract to Quigley & Hafer, 57 Garfield Street, Chambersburg, Pa., for a one-story addition, to cost more than \$65,000. The Watson Engineering Co., 140 Cedar Street, New York, is engineer.

The Charles Warnér Co., Wilmington, Del., building supplies, operating the West Jersey Sand & Supply Co., Philadelphia, and other interests, has begun the erection of a new automatic concrete-mixing plant at Philadelphia, to be provided with storage bins, hoppers, belt-conveyors and other mechanical handling equipment, including loading apparatus.

The Columbia Malleable Castings Co., Second and Linden Streets, Columbia, Pa., is said to be planning a one-story addition to its foundry, for the production of light gray iron castings, to cost in excess of \$25,000. L. R. Zifferer is president and general manager.

The Philadelphia Suburban Water Co., 762 Lancaster Pike, Bryn Mawr, Pa., has awarded a general contract to Frank H. Wilson, Upper Darby, Pa., for a one-story automobile service, repair and garage building at Lansdowne, Pa., for company motor trucks and cars, to cost close to \$40,000 with equipment.

The Lawrence Portland Cement Co., Northampton, Pa., has plans for an addition to its mill at Thomaston, Me., to cost more than \$600,000 with equipment. The Burrell Engineering & Construction Co., 513 West Jackson Boulevard, Chicago, is engineer. J. S. Van Middlesworth is secretary.

The Board of Education, Chestnut and Prince Streets, Lancaster, Pa., is considering the installation of manual training equipment in a three-story addition to the junior high school to cost about \$425,000. William B. Itner, Board of Education Building, St. Louis, is consulting architect.

The Harrisburg Light & Power Co., Harrisburg, Pa., plans a power transmission line in Dauphin and Lebanon Counties to a point near Pine Grove, for connection with the system of the Pennsylvania Power & Light Co.

Construction has begun on an addition to the plant of the John Warren Watson Co., Philadelphia, manufacturer of Watson stabilators. The new building will be one-story, 120 x 950 ft., of steel, concrete and brick construction with saw-tooth roof, and with office extension will provide 120,000 sq. ft. additional floor space. William Steele & Sons are contractors and the Ballinger Co. is architect.

South Atlantic States

BALTIMORE, Nov. 14.

THE Chesapeake Crane Corporation, Keyser Building, Baltimore has succeeded to the plant and business of the Chesapeake Iron Works, Baltimore, and will continue operations as heretofore. The purchasing company will specialize in the production of electric cranes, as in the past.

The Tipton Saw Mfg. Co., Charlotte, N. C., recently formed by F. T. Tipton, Charlotte, and associates, has plans for a one-story factory at Bilworth Station, 50 x 100 ft., to cost close to \$25,000 with equipment. R. E. Moore, Charlotte, is also interested in the company.

The North American Cement Corporation, Baltimore, operating the Security Cement & Lime Co., Citizens' National Bank Building, with mill at Security, near Hagerstown, Md., contemplates extensions and improvements in a number of its mills in different sections, with modernization of present equipment. Headquarters are at Albany, N. Y.

The Board of District Commissioners, District Building, Washington, is asking bids until Nov. 23 for metal lockers for the new McKinley Technical High School.

The Baltimore Copper Smelting & Rolling Co., Canton, Baltimore, has completed plans for a one-story addition 108 x 400 ft., to cost upward of \$250,000 with machinery. The company will also erect a new storage and distributing building.

The Eastern Shore Public Service Co., Salisbury, Md., plans the construction of a new power transmission line from a point near Berlin to the Snow Hill district, to cost about \$80,000.

The Edward Katzinger Co., 1949 North Cicero Avenue, Chicago, manufacturer of bakers' and confectioners' tools, equipment, tinware, etc., has concluded arrangements for the purchase of the plant of the August Maag Co., 509 West Lombard Street, Baltimore, manufacturer of kindred equipment, for a local factory branch. The company acquired property at Fleet, Eighth and Ninth Streets, Baltimore, several months ago for a branch factory, and it is said that this project will now be held in abeyance.

The Consolidated Gas, Electric Light & Power Co., Lexington Building, Baltimore, is considering a new preferred stock issue to total about \$4,000,000, a portion of the proceeds to be used for extensions and improvements.

The Crane Market

NEW inquiry for electric overhead and locomotive cranes is light and prospective purchasers are slow to place orders. Pending business still includes the 13 overhead cranes for the General Electric Co. plant at West Philadelphia and the two 10-ton special overhead cranes for the Franklin Lumber Co., Newark, N. J. The locomotive crane market is decidedly quiet in the East, but there has been some activity in the Middle West and South.

Among recent purchases are:

American Gas & Electric Co., New York, a 50-ton, 3-motor overhead crane for the Appalachian Power Co., reported purchased from the Cleveland Crane & Engineering Co.

New York Central Railroad, New York, a 5-ton hand power crane from an unnamed builder.

Thomas Iron Co., Reading, Pa., a 2-ton, 21-ft. span single I-beam hand power crane from an unnamed builder.

Central Vermont Railway, St. Albans, Vt., a 25-ton locomotive crane from the Industrial-Brownhoist Corporation.

McClintic-Marshall Co., Pittsburgh, two 75-ton overhead cranes, one for Rankin and the other for Pottstown, Pa., from the Morgan Engineering Co. and a 20-ton overhead crane for Rankin and 10-ton for Pottstown, Pa., from a Western builder.

Carnegie Steel Co., Pittsburgh, a 25-ton, 68-ft. span overhead crane with 10-ton auxiliary, from the Alliance Machine Co.

The Bureau of Supplies and Accounts, Navy Department, Washington, is asking bids until Nov. 22 for six electric generator outfits, electric engine driven, for the Norfolk Navy Yard schedule 8058; until Dec. 6 for one vertical fire watertube boiler for the Mare Island yard, schedule 7891; and until Dec. 13, for marine watertube boilers and fittings, for the Mare Island and Puget Sound yards, schedule 8054.

A one-story automobile service, repair and garage building, will be erected by the Davidson Storage & Transfer Co., Eutaw and Lombard Streets, Baltimore, to cost upward of \$75,000 with equipment. Stanislaus Russell, 11 East Lexington Street, is architect.

The Locust Pin Co., Inc., Front Royal, Va., manufacturer of insulator pins and equipment, will rebuild the portion of its plant recently destroyed by fire, with loss reported at \$27,000 including equipment.

The Southern Railway System, 1300 Pennsylvania Avenue, Washington, has awarded a general contract to Dwight P. Robinson & Co., 125 East Forty-fifth Street, New York, for new engine shops at Macon, Ga., with repair facilities, boiler shop, power house, coaling system, etc., to cost close to \$300,000 with equipment.

George N. Roy, 1219 Connecticut Avenue, N. W., Washington, architect, has plans for a three-story automobile service, repair and garage building, to cost about \$130,000 including equipment.

The Heywood-Wakefield Co., 113 West Conway Street, Baltimore, manufacturer of chairs, etc., has leased space about 50,000 sq. ft., in a neighboring building, for a new plant for the manufacture of furniture.

The Auto Supply Co., 203 College Street, High Point, N. C., is planning the purchase of ball and roller bearings, axles, gaskets, etc.

New England

BOSTON, Nov. 14.

BUYING of machine tools is at a low ebb. Sales the first half of November were even less than those for the first half of October, which was one of the duller periods experienced in years. New inquiries are few and all are practically for single tools. The trade is actively negotiating with companies inquiring for equipment a month or more ago, but apparently are no nearer placing orders. No new machine tools of importance were reported sold the past week. Sales of used tools included a 3-ft. radial drill, a 16-ft. lathe, a shaper, a press, several power saws and other small equipment. Due to the flood there has been an exceptional demand for all kinds of pumps.

Small tool dealers report business as only fair, with November bookings running considerably behind October.

If the New England flood created a need for machine tool equipment, it has not yet made itself felt. It is believed in local machine tool circles that some machine tool builders in the floor area, particularly in Vermont, suffered losses, but not heavy ones. In Hartford, Conn., the flood came within comparatively few feet of the Pratt & Whitney Co. plant but did no damage. The E. Horton & Sons Co., Windsor Locks, Conn., chucks, suffered considerable damage by water. At Springfield, Mass., the Perkins Machine & Gear Co. suffered a loss of \$10,000. The Perfection Grate & Stoker Co., Package Machinery Co., American Bosch Magneto Corporation, Fleming Foundry, Blair Mfg. Co., Bemis Car Truck Co., and other companies suffered minor losses by water and were forced to curtail operations for a

short time. The Gilbert & Barker Mfg. Co. and the Boston & Albany Railroad shops, West Springfield, suffered fairly heavy losses, but just how much or how much mechanical equipment is involved is not known. Several Fitchburg, Mass., plants felt the effects of the flood. Greenfield, Mass., plants escaped damage. Reports from Vermont and New Hampshire are few and largely unreliable. It is quite certain, however, that first press reports regarding damage to manufacturing plants and machine tool making plants were exaggerated. First reports said the plants of the National Acme Co. and the Cone Automatic Machine Co., Windsor, Vt., and machinery were badly damaged, whereas losses are not nearly as large as at first thought.

L. W. Moody, 25 Willow Street, Boston, will build a machine shop to cost \$10,000 to \$15,000 without equipment.

W. F. Brooks, Gold and Lewis Streets, Hartford, Conn., architect, closes bids Nov. 17 on a two-story trade school, 57 x 100 ft., with wing, 28 x 45 ft., for Bristol, Conn.

The Nash Engineering Co., South Norwalk, Conn., has bought eight acres adjacent to its plant which it proposes to use for manufacturing extensions. Details have not been worked out.

The heaviest property damage from floods in Burlington, Vt., fell on the wood-working plant of the W. O. Lane Co. It was destroyed with a loss of approximately \$100,000.

The Manchester Tool Co., Adams Street, Manchester, Conn., reamers and special tools, has started production. Conrad H. Beaupre is general manager. Charles W. Hollister is in charge of the office.

C. H. Dexter Sons, Inc., Windsor Locks, Conn., has work nearing completion on a four-story addition to its paper mill, 90 x 100 ft., and proposes to have it ready for service by the close of the year. It will cost in excess of \$100,000 with machinery.

The Eastern Malleable Iron Co., Naugatuck, Conn., has taken over the plant of the Malleable Iron Works, New Britain, Conn., and will continue operations as a branch works. Control of the Malleable company was secured a few months ago.

Fire, Nov. 1, destroyed a portion of the plant of the Puritan Cold Storage Co., Provincetown, Mass., with loss reported at close to \$45,000 with equipment. Plans for rebuilding are under consideration.

The Post Office Department, Washington, is asking bids until Nov. 30 for the construction of a three-story and basement automobile service, repair and garage building, totaling about 120,000 sq. ft. of floor space, on Ipswich Street, Boston, for department cars and trucks, to cost upward of \$250,000 with equipment. Plans and specifications at the office of D. J. Rapp, post office inspector, Post Office, Boston.

The Commonwealth Ice & Cold Storage Co., Fish Pier, Boston, has filed plans for extensions and improvements in its power house to cost \$80,000. Additional equipment will be installed.

The E. H. Hotchkiss Co., Hoyt Street, Norwalk, Conn., manufacturer of metal snap fasteners, paper clips, etc., has plans for an addition to cost more than \$65,000 with equipment. The Ballinger Co., 105 South Twelfth Street, Philadelphia, is architect and engineer.

The New Departure Mfg. Co., Bristol, Conn., manufacturer of ball bearings, etc., has awarded a general contract to J. D. Devine, local, for a one-story addition, 51 x 91 ft., to cost close to \$18,000 with equipment.

The B. F. Sturtevant Co., Hyde Park, Boston, manufacturer of mechanical draft apparatus, is completing plans for a new branch plant at Galt, Ont., to be one-story, 60 x 150 ft., and to cost close to \$45,000 with equipment.

The Carpenter Steel Co., Hartford, Conn., has revised plans for a storage and distributing plant to be one and

two-stories, 50 x 150 ft., to cost more than \$30,000 with equipment. Buck & Sheldon, Inc., Hartford, is architect and engineer.

The United Shoe Machinery Co., Beverly, Mass., has plans for a four-story addition, 60 x 200 ft., to cost in excess of \$80,000 with equipment.

The Peerless Unit Ventilation Co., Inc., has removed its main offices and factory to 718-734 Crescent Avenue at Hallett Street and Sea View Avenue, Bridgeport, Conn. It maintains New York offices at 369 Lexington Avenue.

The Alchrome Bearing & Castings Corporation, Cheshire, Conn., has established sales agencies with the following companies: Park & Williams, Inc., Philadelphia; Verner Steel Products Co., Chicago, and the Modern Engineering Co., Pittsburgh. The Alchrome corporation operates a foundry for non-ferrous castings.

Pittsburgh

PITTSBURGH, Nov. 14.

AN improved tone in the steel market finds reflection in machine tool trade sentiment, but actual business still is slow and there is little hope that the remainder of this year will produce orders sufficient to bring sales or profits for the year up to those in 1926. The first eight months of 1927 furnished some gain over the same period last year, but this has been wiped out in the light demand of the past three months.

Bids will be received by the city controller, City-County Building, Pittsburgh, until Nov. 23, for equipment for the Ross pumping station including boilers, superheaters, coal-feeding equipment and auxiliary apparatus. Plans and specifications at the office of the Bureau of Engineering, room 440, City-County Building.

The Nilco Lamp Works, Inc., Emporium, Pa., manufacturer of electric lamps, has concluded negotiations for the purchase of the plant and business of the M. & W. Lamp Co., Springfield, Mass. Operations will be discontinued at the Springfield works, and a portion of the machinery will be removed at once to the St. Mary's, Pa., plant of the purchasing company.

The State Road Commission, Charleston, W. Va., will soon begin the construction of a three-story automobile service, repair and garage building for State-owned motor trucks and cars, to cost close to \$80,000 with equipment.

The A. F. Thompson Mfg. Co., Vernon Street, Huntington, W. Va., manufacturer of gas stoves, etc., has begun foundations for an addition to provide about 25,000 sq. ft. increased floor space, to cost more than \$50,000 with equipment.

The United States Engineer, Huntington, W. Va., is asking bids until Nov. 22 for steel wire flue brushes, washers, machine bolts, etc., circular 93.

The Hygeia Ice Co., West Main Street, Uniontown, Pa., is planning to rebuild the portion of its ice-manufacturing plant destroyed by fire Nov. 8, with loss close to \$50,000 including equipment.

The Fairmont Independent School District, Fairmont, W. Va., plans the installation of manual training equipment in a new high school to cost more than \$200,000, for which bids will be received on a general contract until Dec. 20. William B. Ittner, Board of Education Building, St. Louis, is architect. Robert C. Jones is president of the board.

Buffalo

BUFFALO, Nov. 14.

C. M. KEYS, president Curtiss Aeroplane & Motor Co., 74 Kail Street, Buffalo, and associates, with Major William B. Robertson, St. Louis, are organizing the Curtiss-Robertson Aircraft Corporation. Property will be acquired in the vicinity of St. Louis for a new plant for the manufacture of commercial airplanes, particularly of monoplane type, to be sold under the name of the Curtiss Robins. The initial works for parts and assembling are scheduled to be ready for service next April, and are reported to cost more than \$100,000. The Curtiss company will be in charge of the technical branches of production.

The Vacuum Oil Co., Olean, N. Y., has begun an expansion program in the still department at its local refinery, to include the installation of pipe stills and auxiliary equipment, to cost upward of \$200,000. Executive offices are at 61 Broadway, New York.

The Common Council, Herkimer, N. Y., is said to be planning the installation of pumping equipment in connection with proposed extensions and betterments in the municipal waterworks, to cost close to \$700,000.

The Hoosick Machine & Tool Co., Hoosick Falls, N. Y., recently formed with a capital of \$25,000, plans the operation of a local machine and tool shop, with facilities for die manufacture, etc. Salem H. White and Alfred H. Humphrey, Hoosick Falls, are heads.

The Board of Education, Sherman Trust Building, Watertown, N. Y., is considering the installation of manual training equipment in a new junior high school to cost more than \$250,000, for which plans will be drawn by Lansing & Green, Sherman Trust Building, architects.

The J. A. Zurn Mfg. Co., Fourteenth and German Streets, Erie, Pa., manufacturer of plumbing equipment and supplies, steam specialties, etc., will soon take bids for a new plant to cost more than \$250,000 with equipment. Wilbur Watson & Associates, 1614 Prospect Avenue, Cleveland, are architects and engineers.

Chicago

CHICAGO, Nov. 14.

BUYING of machine tools in odd and scattered lots is well sustained, bringing November in line with the preceding month. Fresh inquiry is improving and the outlook is favorable. The Burlington has purchased a 54-in. carwheel lathe for delivery to West Burlington, Iowa, and the Lake Superior & Ishpeming Railroad has closed for a carwheel borer. A Chicago terminal railroad placed a 22-in. shaper, and a textile machinery manufacturer has purchased six milling machines. Deere & Co., Moline, Ill., have placed two engine lathes and will buy several more, and the International Harvester Co. has ordered two shapers. The expansion program of the Nash Motors Co. is well under way at Racine, Wis., a part of the tool requirements having been bought the past week.

Prices on one line of milling machines and several makes of lathes have been advanced 10 per cent.

The Kytseid Mfg. Co., 911-21 West Forty-ninth Place, Chicago, has sold one of its 12-ft., ¼-in. capacity steel electric-arc welded power shears to the Gleaner Combine Co., Independence, Mo., and a 10-ft., ⅜-in. capacity shear to the Richardson Scale Co., Clifton, N. J.

The Sherman-Klove Co., Chicago, maker of milled nuts, will build a factory to cover 34,000 sq. ft. at 3531 West Forty-seventh Street.

The Russakov Can Co., Carpenter and Ogden Streets, Chicago, will build a factory, 194 x 323 ft., to cost \$110,000. B. B. Shapiro, 6 North Michigan Avenue, is engineer.

The City Council, Highland Park, Ill., is having plans prepared for a municipal pumping station and filtration plant. Pease, Greeley & Hanson, 6 North Michigan Avenue, Chicago, are engineers.

The Hazard Mfg. Co., Wilkes-Barre, Pa., manufacturer of electrical wires and cables, has moved its Chicago office to 1840 Midland Building, 168 West Adams Street. The Chicago office and warehouse of the Hazard Wire Rope Co., manufacturer of wire rope and wire rope fittings, now separate and distinct from the Hazard Mfg. Co., will be retained at 32 South Clinton Street.

The American Laundry Machine Co., 1824 North Spaulding Avenue, Chicago, has filed plans for a three-story addition, 61 x 95 ft., to cost approximately \$110,000 with equipment.

The Arctic Fountain & Fixture Co., 2147 West Lake Street, Chicago, manufacturer of soda fountains, mechanical refrigerators, etc., has purchased the works of the Illinois Thresher Co., Sycamore, Ill., and will establish a new plant at this location.

The Rock Island Stove Co., Fourth Street, Rock Island, Ill., has awarded contract to the Greenleaf Construction Co., Musenfelder Building, for a one-story addition, to cost about \$32,000 with equipment. Leon Mitchell is vice-president.

The Enterprise Specialty Mfg. Co., 4145 West Kinzie Street, Chicago, operating a general wood-working plant, has purchased the one-story factory, 75 x 130 ft., at 4043 West Kinzie Street, for the establishment of a new plant. It is understood that the present works will be removed to the new location.

The Carney Cement Co., Mankato, Minn., is said to be planning to rebuild the portion of its mill destroyed by fire Nov. 5, with loss reported in excess of \$100,000 including equipment.

The Fisher Governor Co., Marshalltown, Iowa, manufacturer of engine governors and kindred equipment, is contemplating the erection of a one-story addition, to cost more than \$25,000 with equipment.

The Hess Warming & Ventilating Co., 207 South Western Avenue, Chicago, has plans for a three-story addition, to cost upward of \$90,000 with machinery. W. H. Tomlinson, Morris Building, Joliet, Ill., is architect.

The Midwest Steel & Iron Co., Pueblo, Colo., will erect a one-story steel fabricating unit to cost close to \$30,000.

The Parsons Co., Newton, Iowa, manufacturer of drag line excavators and kindred machinery, has filed plans for a one-story addition, to cost more than \$20,000 with equipment. A portion of the structure will be used as a tool department. A new electric furnace will be installed.

John Hocke, 1604 East Seventy-ninth Street, Chicago, architect, has plans for a two-story automobile service, repair and garage building, to cost close to \$200,000 including equipment.

The LeMoyné Parlor Frame Co., 2614 Grand Avenue, Chicago, has awarded a general contract to Lindenschmidt Brothers, 4122 Dickens Avenue, for a new three-story plant, 50 x 100 ft., to cost \$55,000.

The Caterpillar Tractor Co., Peoria, Ill., has started construction on an addition to its plant, to be 400 x 1200 ft. The building will cost about \$500,000 and an equal amount will be spent on machinery and equipment. It is expected to be in operation soon after the first of the year.

The Damascus Steel Products Corporation, Rockford, Ill., has plans for a new one-story factory, to cost \$70,000, which will provide 15,000 sq. ft. of additional space.

The Gerrard Co., Inc., has been formed to take over the Ti-It Machines Co., Monadnock Building, San Francisco, and the Gerrard Wire Tying Machine Co., 1940 South Fifty-second Avenue, Chicago. The new company will begin with wire fabricating plants and warehouses at Brooklyn, Chicago, San Francisco, Seattle and McKees Rocks, Pa., and further establishments will be added as needs develop. A. J. Gerrard will be president of the new corporation. E. A. W. Murray, formerly president Ti-It Machines Co., will be vice-president and Western manager, and T. J. King, formerly vice-president and general manager of the Gerrard organization, will be vice-president and Eastern manager, with headquarters at Chicago.

Cleveland

CLEVELAND, Nov. 14.

MACHINE tool orders and inquiry showed some gain the past week and the outlook is regarded as a little brighter than for some time. The U. S. Aluminum Co., Cleveland, is buying equipment for its new permanent mold foundry and during the week purchased two 42-in. boring mills, a planer, two shapers and a 24-in. upright drilling machine, and has pending five 24-in. and 16-in. lathes. The Akron Rubber Mold & Machine Co., Akron, and another Akron tire mold manufacturer each bought an open side planer. A Cleveland company purchased an automatic worm grinder. The Cleveland State Hospital is taking bids on a 6-in. pipe threading machine.

Contract has been let by the Herbrand Co., Fremont, Ohio, manufacturer of forgings, etc., to the Austin Co. for a one-story addition totaling about 15,000 sq. ft. of floor space, to cost approximately \$50,000 with equipment. A portion of the local East Side works of the company will be removed to the new unit.

The Whitmer-Jackson Co., West Sandusky, Ohio, manufacturer of sash, doors and other millwork products, is considering rebuilding the portion of its plant destroyed by fire Nov. 7, with loss close to \$35,000 including equipment. Headquarters are at 1996 West Third Street, Cleveland.

The Thompson-Owens Corporation, Toledo, Ohio, recently organized, will establish a local plant in a building along the line of the Toledo Terminal Railroad, for the manufacture of bronze bushings and bearings, bronze and brass castings, and kindred products. George Thompson, for a number of years connected with the Bunting Brass & Bronze Co., Toledo, is president and general manager. J. E. Owens, secretary and treasurer, also was formerly associated with the Bunting company.

The G. E. Olenberg Motor Sales Co., 3201 West Twenty-fifth Street, Cleveland, has plans for a two-story service, repair and garage building to cost approximately \$100,000 with equipment.

The New York Central Railroad Co., Union Trust Building, Cleveland, has filed plans for a one-story addition to its steam power plant at East 152nd Street, including mechanical draft department for blower service, to cost \$65,000 with equipment.

The Ohio Power Co., Canton, Ohio, is completing plans for extensions in its steam-operated power house at Philo, Ohio, to increase the capacity by 165,000 kw., reported to cost in excess of \$5,000,000.

Detroit

DETROIT, Nov. 14.

CONTRACT has been let by the Olds Motor Works, Lansing, Mich., to the Reniger Construction Co., local, for a one-story plant unit to cost in excess of \$125,000. Albert Kahn, Inc., Marquette Building, Detroit, is architect.

The General Motors Corporation, Detroit, is reported to be closing arrangements for the purchase of more than 600 acres at Long Beach, Cal., for a Pacific Coast assembling plant. It is understood that the works will be used primarily for the Chevrolet division, with cost placed at more than \$1,000,000. The company has awarded contract to the Indiana Bridge Co., Muncie, Ind., for structural steel framing for the initial units of the assembling works for the Chevrolet division at Atlanta, Ga.

The Hayes-Ionia Co., Grand Rapids, Mich., manufacturer of automobile bodies, has been carrying out an extension and improvement program at Ionia, to convert the works for an assembling unit, with close to three times the former capacity.

The City Council, Marine City, Mich., contemplates the installation of pumping equipment in connection with a new municipal water system. A fund of \$100,000 is being arranged for the entire project.

The Decatur Cold Storage Co., Decatur, Mich., will rebuild the portion of its plant destroyed by fire Nov. 6, with loss close to \$40,000 including equipment.

The Calumet smelter of the Calumet & Hecla Consolidated Copper Co., Calumet, Mich., is completing plans for the construction of a new unit, making the fourth to be constructed; plans are said to be under advisement for a fifth. The company will discard smaller furnaces of about 35,000-lb. capacity, as soon as the new smelting unit is available. The immediate expansion program is estimated to cost in excess of \$250,000.

The Oakland Motor Car Co., Pontiac, Mich., has awarded a general contract to the W. E. Woods Co., Ford Building, Detroit, for its one-story assembling unit, 540 x 640 ft., to cost more than \$1,200,000 with machinery. Albert Kahn, Inc., Marquette Building, Detroit, is architect.

The Chris Smith & Sons Boat Co., Algonac, Mich., is arranging an expansion program, to include additional shops and installation of new equipment.

Cincinnati

CINCINNATI, Nov. 14

MACHINE tool business in the first half of November shows a recession from the level maintained during October. The number of outstanding quotations remains large, but definite action on many is not expected until the early months of 1928. One or two automobile companies are making small purchases, but orders from this industry are at a low point. Sales consist almost entirely of single machines from widely scattered sources.

Bids have been asked on a general contract by the Davis Welding & Mfg. Co., 1120 Richmond Street, Cincinnati, for a one-story addition, to cost more than \$40,000 with equipment. Lockwood, Greene & Co., 400 North Michigan Avenue, Chicago, are architects and engineers.

The Board of Education, Louisville, plans the installation of manual training equipment in a four-story school at Herman and Fortieth Streets, to cost about \$750,000. J. Meyrick Cooley is architect.

The Air Corps, Material Division, Wright Field, Dayton, Ohio, is asking bids until Nov. 23 for aircraft parts, circular 136; until Nov. 21, for two solid aluminum alloy propeller assemblies, and three propeller blades, circular 123.

The League of Dayton Commission Merchants, Fourth and St. Clair Streets, Dayton, Ohio, Isaac Bilenkin, president, in cooperation with the Pennsylvania Railroad, Cincinnati, A. W. Duke, engineer in charge, is planning the construction of a two-story fruit terminal, with cold storage and refrigerating department and mechanical handling equipment. The entire project is reported to cost in excess of \$400,000.

J. B. Burrus, Ethridge, Tenn., and associates are planning the establishment of a new plant at Franklin, Tenn., for the manufacture of automobile pumping equipment, including parts and assembling departments. An option has been taken on the mill of J. L. Brevard, as the initial works.

Fire, Nov. 7, destroyed a portion of the storage and distributing plant of the Planters' Hardware Co., Hopkinsville, Ky., with loss reported upward of \$300,000. Plans are under consideration for rebuilding.

The Kentucky Utilities Co., Starks Building, Louisville, is planning extensions and improvements to cost about \$85,000, including the construction of a new power transmission line from London to Cumberland and vicinity, with substation at the last noted place.

The W. A. Griswold Co., Nashville, Tenn., recently formed with a capital of \$100,000 by W. A. Griswold, 3403 West End Avenue, and associates, has leased a building at West Nashville and will remodel for the manufacture of stoves, ranges, etc. The initial works is reported to cost close to \$40,000 and is scheduled to be ready for service by the first of the year. J. Warner Griswold, Nashville, is also interested in the new company.

The Board of Education, Memphis, Tenn., plans the installation of manual training equipment in a new technical high school to cost \$500,000, for which bids have been asked on a general contract. Hanker & Cairns, 123 South Court Street, are architects.

The V. L. Nicholson Co., 102 West Clinch Street, Knoxville, Tenn., is in the market for pressed steel split pulleys.

The Queen City Machine Tool Co., Cincinnati, has turned over all patterns, jigs and special tools to the Manufacturers Gear & Machine Co., McMicken Avenue and Tafel Street, Cincinnati, which will furnish repairs for Queen City shapers and later expects to manufacture this line of machine tools.

The Safety Emery Wheel Co., Springfield, Ohio, has changed its name to the Safety Grinding Wheel & Machine Co.

Milwaukee

MILWAUKEE, NOV. 14.

MODERATE activity is reported by machine-tool manufacturers and production is at about the average of recent months. The slowing down of automobile plants appears to be delaying the closing of considerable business, although orders recently have been placed for special equipment for delivery early in the spring. Replacement business accounts for the bulk of the present demand, as few industries are making additions to capacity and the buying of equipment generally is dictated by urgent necessities.

The Waukesha Motor Co., Waukesha, Wis., has placed the general contract with the Wisconsin Bridge & Iron Co., Milwaukee, for a brick and steel addition, 60 x 418 ft., two stories to cost about \$100,000 with equipment. The company manufactures heavy-duty gasoline engines.

The Hudson Mfg. Co., 324 Third Avenue, North, Minneapolis, Minn., has broken ground for a new plant costing about \$50,000 at Hudson, Wis. The general contractor is Edward Bjorklund, 914 Builders Exchange, St. Paul, Minn. The company manufactures metal dairy and barn equipment and fixtures.

The Milwaukee Engineering & Mfg. Co., Milwaukee, has been organized with capital stock of \$15,000 by F. A. Sacherman, president, and Paul H. Felertag, secretary-treasurer. Ajax Tool & Die Co., 265 South Water Street, in association with Virgil R. Tate, to manufacture mechanical appliances, special machinery, etc.

J. E. Burke, Fond du Lac, Wis., manufacturer of metal radiator cabinets, metal weather strips, etc., is completing plans for a new factory and main office in Milwaukee, continuing, however, the operation of the present shop in Fond du Lac. Details are expected in about ten days.

Behnke & Jensen, Royalton, Wis., have completed work on a new aluminum foundry as an extension of their machine shop business, thus providing for their own supply of castings. The company manufactures vacuum pumps and tanks, pulsators, pail lids, milking machine handles, etc. Arrangements are being made for the manufacture of complete milking machines.

The West Bend Aluminum Co., West Bend, Wis., has started work on the construction of a second story, 50 x 300 ft., to its main shop, to be used for manufacturing, storage and office purposes.

The Board of Education, Watertown, Wis., has engaged Edward Tough, architect, Madison, Wis., to prepare plans for a two-story and basement addition, 50 x 167 ft., to the high school, the new area to be used as a junior high and vocational training school. Bids will be taken about Dec. 15 and work started early in the spring. R. A. Buell is superintendent of schools.

The Board of Education, Wauwatosa, suburb of Milwaukee, will close bids Nov. 28 for the construction of the

first unit of a new senior-junior high school and vocational training institute, for which \$250,000 has been appropriated. Plans are by Herbst & Kuenzli, architects, 130 Wisconsin Avenue, Milwaukee. William G. Schrubbs is chairman of the building committee.

The Milwaukee Gas Tool Corporation, Milwaukee, has been organized to manufacture a newly perfected gas hammer and demolition tool on a commercial basis. Headquarters have been established at 110 East Wisconsin Avenue. The names of the principals have not yet been given out.

The Board of Education, Baraboo, Wis., is asking bids until Dec. 14 for the construction of a new high school, with manual training facilities, designed by Claude & Starck, architects, Madison, Wis. The estimated cost is \$275,000. A. F. Reiner is secretary of the board.

Gulf States

BIRMINGHAM, NOV. 14.

A PERMIT has been secured from the State Board of Water Engineers by the Central Power & Light Co., First National Bank Building, San Antonio, Tex., for a hydroelectric power development on the Devil's River, vicinity of Ingleside, Tex., with ultimate output of 25,000 hp., to cost close to \$1,000,000 with power dam and transmission system.

The Roxana Oil Co., City National Bank Building, San Antonio, Tex., is said to be planning construction of a gasoline refinery in the Rosenfield oil district, near Brownwood, Tex., to cost upward of \$100,000 with machinery.

The L. Seline Sheet Metal Works, 608 Clay Street, Houston, Tex., has acquired property, 50 x 100 ft., and is contemplating a new one-story plant.

The Armour Fertilizer Works, New Orleans, contemplates rebuilding the portion of its local plant recently destroyed by fire, with loss in excess of \$80,000 with equipment. Headquarters are at 111 West Jackson Boulevard, Chicago.

E. J. Roberts, 3600 Hemphill Street, Fort Worth, Tex., is at the head of a project to construct and operate an ice-manufacturing plant at Cross Plains, Tex. A site has been selected. The initial unit will have a capacity of 30 tons per day and will cost close to \$50,000 with machinery.

The Birmingham Pressed Steel Co., Ensley, Ala., manufacturer of steel stampings, etc., will build a one-story plant, 50 x 150 ft. It is understood that a portion of the unit will be given over to the production of steel toy specialties.

The West Texas Utilities Co., Abilene, Tex., has plans for an addition to its steam-operated electric generating station at San Angelo, Tex., to include the installation of a new 6000-kw. turbo-generator, with condenser, boilers and auxiliary equipment, to cost more than \$400,000. Sargent & Lundy, 72 West Adams Street, Chicago, are engineers.

The Humble Oil & Refining Co., Humble Building, Houston, Tex., is pushing construction of a new oil refinery near San Antonio, Tex., to cost upward of \$200,000 including machinery.

The Board of Education, Birmingham, plans the installation of manual training equipment in a new high school on South Highlands Avenue, where site has just been secured, to cost approximately \$1,000,000. Warren, Knight & Davis, Empire Building are architects.

The Long-Lewis Hardware Co., 2014 Second Avenue, Bessemer, Ala., has plans for a new multi-story storage and distributing plant in the Smith Park section, to cost in excess of \$40,000 with equipment. Denham, Van Keuren & Denham, Age-Herald Building, are architects.

The City Ice Co., San Antonio, Tex., operated by the Southland Ice Co., Dallas, Tex., is said to be contemplating a one-story ice-manufacturing plant at the Pleasanton Road and Toudouze Street, to cost approximately \$80,000 with equipment.

The American Brick Co., Nassar Building, McAllen, Tex., recently organized, will erect a new brick-manufacturing plant at Rio Grande, Tex., with initial capacity of 50,000 brick per day. A department will be installed for the production of tile. The entire project is expected to cost more than \$50,000 with equipment. The company is understood to be planning the purchase of a ½-yd. capacity power shovel, gasoline-operated.

The Gulf States Utilities Co., Beaumont, Tex., operating electric light and power properties, etc., has arranged for an increase in capital from 300,000 to 350,000 shares of stock, no par value, a portion of the proceeds to be used for expansion.

The Phillips Petroleum Co., Bartlesville, Okla., will purchase the oil refinery of the Alamo Refining Co., Bor-

ger, Tex., and will take over the property at once. Plans are under consideration for extensions and improvements.

Ovens, power equipment, conveying and other machinery will be installed in the plant to be erected by the Sherman Bread Co., Sherman, Tex., to cost about \$50,000, of which close to \$30,000 will be expended for equipment. John Tulloch is architect.

The Hughes Tool Co., 300 Hughes Street, Houston, Tex., manufacturer of oil well tools and equipment, has taken out a permit for a one-story machine shop, 140 x 300 ft., to cost approximately \$70,000 with equipment.

L. L. Featherstone, 516 Dalzell Street, Shreveport, La., and associates are organizing a new company under the name of the Southwestern Cast Iron Pipe Co., to establish and operate a local foundry.

St. Louis

ST. LOUIS, Nov. 14.

THE Bar-Rusto Corporation, Kansas City, Mo., has leased a building at 1808 Locust Street, for the establishment of a plant for rust-proofing iron and steel under a special process. A department will be provided for chromium plating. Robert M. Candlish is president.

The City Ice Co., Twenty-first and Campbell Streets, Kansas City, Mo., will erect a new one-story ice manufacturing plant in the Sheffield district, to cost upward of \$45,000 with equipment.

The Root Refineries, Inc., El Dorado, Ark., is considering rebuilding the portion of its oil refinery destroyed by fire Nov. 5, with loss close to \$50,000 with equipment. Headquarters are at Shreveport, La.

The Lincoln Power Co., Poteau, Okla., David Reid, 1622 North A Street, president, is said to be arranging the immediate construction of a hydroelectric generating plant on the Poteau River, about six miles from Poteau, to cost close to \$350,000 with machinery and transmission line. A portion of the output will be used by the Oklahoma Gas & Electric Co., Oklahoma City, Okla., which is understood to be interested in the project.

The Missouri-Kansas-Texas Lines, Dallas, Tex., contemplates the construction of a one-story forge and blacksmith shop and one-story wood-working shop to its repair shops at Muskogee, Okla., to cost approximately \$50,000 with machinery.

Morton Brothers, Lexington, Neb., manufacturers of aircraft and parts, are considering the establishment of a new plant at McCook, Neb., to cost approximately \$40,000 with equipment.

The Mid-West Piping & Supply Co., 1452 South Second Street, St. Louis, will soon take bids for a one-story addition, 92 x 100 ft., to cost about \$20,000. Klipstein & Rathman, 316 North Eighth Street, are architects.

The City Council, Hamilton, Mo., plans the installation of pumping machinery and power equipment in connection with extensions and improvements in the municipal waterworks. A fund of \$30,000 is being arranged for the project. The Burns & McDonnell Engineering Co., Interstate Building, Kansas City, Mo., is engineer.

The Missouri Asphalt Refining Corporation, Sheldon, Mo., is planning installation of a new plant on a local tract of about 1000 acres, and will purchase a steam shovel, with drag line apparatus; two crushers, each with output of 1000 tons per day; 32-ton locomotive; 20 dump cars, rails, etc. Ernest Pearce is consulting engineer.

The Linde Air Products Co., 30 East Forty-second Street, New York, manufacturer of commercial oxygen, etc., has awarded contract to the H. W. Underhill Construction Co., 235 North Waco Street, Wichita, Kan., for a one-story and basement plant, 60 x 100 ft., at Wichita, to cost about \$30,000.

Indiana

INDIANAPOLIS, Nov. 14.

THE General Electric Co., Fort Wayne, Ind., has awarded a general contract to the Indiana Engineering & Construction Co., Central Building, for a one-story addition, 90 x 120 ft., to cost approximately \$50,000 with equipment.

The Schaaf & Good Co., Fremont, Ohio, manufacturer of cutlery, has acquired the plant and business of the Tipton Cutlery Co., Tipton, Ind., and will take immediate possession. It is proposed to remove the Tipton business to Fremont, where an expansion program will be carried out to accommodate the increase.

The Crescent Stove Works, Inc., Evansville, Ind., is said to be arranging to rebuild the portion of its pattern shop recently destroyed, with loss close to \$20,000, with equipment.

The Truck Engineering Corporation, East Pontiac Street, Fort Wayne, Ind., manufacturer of motor truck equipment, is completing plans for a one-story sawtooth type addition, 60 x 100 ft., to cost more than \$35,000 with equipment. Guy Mahurin, Standard Building, is architect.

The Bartlett Electric Products Co., Goshen, Ind., manufacturer of electrical equipment, is considering rebuilding the portion of its plant destroyed by fire Nov. 7, with loss reported at \$23,000 including equipment.

L. E. Emerling, 1501 South Hohman Avenue, Hammond, Ind., has plans for a one-story machine shop, with facilities for automobile repairs, to cost close to \$45,000. Mac Turner, 623 South Hohman Avenue, is architect.

Following the recent consolidation of the Auto Accessories Mfg. Co., 401 South Seventeenth Street, Chicago, with the Delta Electric Co., Marion, Ind., the plant of the first noted has been removed to Marion where production will be concentrated.

The Taylor Chain Co., 140 South Dearborn Street, Chicago, S. G. Taylor, Jr., president, manufacturer of steel chains, etc., has awarded a general contract to the Industrial Construction Co., 53 West Jackson Boulevard, for a one and two-story plant at Hammond, Ind., 40 x 120 ft., to cost about \$35,000 with equipment.

The Metalcraft Mfg. Co., Indianapolis, manufacturer of custom built automobile windshields, has established a plant at 634 West Washington Street and has started production. E. C. Schaffer is president and general manager.

Pacific Coast

SAN FRANCISCO, Nov. 9.

THE West Stanislaus Irrigation District, Patterson, Stanislaus County, Cal., will issue bonds in amount of \$1,216,376 for extensions and improvements in its system, including equipment purchases. The latter will include 32 pumping units, each with capacity of 45 cu. ft. per sec., to cost \$88,000; 32-150 hp. motors for direct-connection to pumps; pump station transformers, \$25,000; substation transformers and equipment, \$32,500; transmission lines, poles, insulators, lightning arresters, and kindred equipment. W. F. Woolley, Patterson, is chief engineer.

The California-Oregon Power Co., San Francisco, operating in northern California and southern Oregon, has arranged a bond issue of \$4,000,000, a portion of the proceeds to be used for extensions and improvements. The company has work in progress on a new hydroelectric generating plant on the North Fork of the Rogue River in Oregon, to be known as Prospect Station No. 2. It will have an initial capacity of 16,000 kw.; additions will be carried out later to increase this to 48,000 kw. Extensions will be made in transmission lines.

Butler Brothers, Rand and Canal Streets, Chicago, operating a general merchandise business, including heavy and light equipment, have plans for a seven-story storage and distributing plant at San Francisco, to cost about \$750,000 with equipment. Bliss & Fairweather, Balboa Building, San Francisco, are architects; T. Ronneberg, Crocker Building, is engineer.

Kenneth Macdonald, Spring Arcade Building, Los Angeles, architect, has plans for a multi-story automobile service, repair and garage building to cost upward of \$200,000 with equipment.

The Mountain Ice Water Co., Redlands, Cal., will build a two-story cold storage and refrigerating plant 80 x 150 ft., to cost about \$50,000 with equipment. Howard E. Jones, Katz Building, San Bernardino, Cal., is architect.

The Petroleum Securities Co., Petroleum Security Building, Los Angeles, E. L. Doheny, president, is completing plans for a new oil storage and distributing plant at Richmond, Cal., where property has been leased on San Francisco Bay, to cost close to \$650,000 with equipment. It is understood that bids will be asked in December. The engineering department of the company is in charge.

The Carpenter Machine Works, 2538 Westlake Street, North, Seattle, will build a one-story machine shop, 40 x 85 ft.

The Olympic Portland Cement Co., Marietta Road, Bellingham, Wash., will make extensions and improvements in the crusher house at its local mill and install additional crushing and auxiliary equipment.

The Board of Public Works, Seattle, plans to ask bids soon for electrical machinery and accessory equipment for the No. 6 unit of its Cedar Falls municipal hydroelectric power project, to cost upward of \$300,000. The installation will include a 14,000 kva. generator set, 14,000 kva. transformers, switchboard apparatus and accessories.

Canada

TORONTO, Nov. 14.

INDUSTRIAL activity still continues and machine tool salesmen report a steady flow of orders for replacement needs and for new works. The placing of 14 tools by the Canadian National Railways was the principal feature of the market the past week, and orders are also expected from other railroads. Business in the first nine months of this year has been much better than that for the corresponding period of 1926.

It is reported that the Ford Motor Co. of Canada is not much over 50 per cent prepared to start production on its new model, and additional orders are looked for from this source. Following the recent closing of \$400,000 worth of equipment for the pressed metal department, the General Motors Corporation, Oshawa, Ont., has issued another list for tools for the front axle department, now under construction, which will cost approximately \$100,000.

The Carbon & Alloy Steel Co., Welland, Ont., recently formed, has taken over the local plants formerly operated by the Electric Steel & Metal Co. and the Electric Steel & Engineering Co. The company intends to reopen the foundry immediately and will specialize in the production of manganese steel and alloy steel castings from 1 lb. to 14 tons, as well as in the production of forging ingots. Sydney F. Wiles, formerly of Sheffield, England, is president and general manager.

Bids will be received until Dec. 7 by Mayor F. F. Trevelean, chairman of the Board of Control, City Hall, Hamilton, Ont., for additional equipment for the Beach pumping station. W. L. McFaul, city engineer, provides two alternatives in the tenders. The first is for a steam turbine reduction gear-driven centrifugal pump and accessories; the other for a Diesel engine-driven pump and accessories. Tenders are also being called for a 400-hp., boiler and stack, which will be required if the steam pump is used. The selection will depend largely on the cost of installation. The steam turbine or Diesel pumps are to have a capacity of 10,000,000 gal., and will replace the Gartshore 5,000,000 gal. pumps.

The National Cement Co., Montreal, is contemplating building an addition with capacity of 300,000 bbl., with the intention of bringing the annual capacity up to 1,200,000 bbl.

The ratepayers of Leamington, Ont., carried a by-law granting a fixed assessment and other concessions to the H. J. Heinz Co., in return for which the company will build a three-story plant, 125 x 185 ft., to cost \$100,000.

The B. F. Sturtevant Co., First Avenue, Galt, Ont., is planning an addition to its plant, and later proposes to build an extension to its machine shop.

The Preston Woodworking Machinery Co., Preston, Ont., has let contract for an addition, 100 x 200 ft. to its plant, to cost \$20,000.

The Canada Glass Products, Hull, Que., which specialize in washed silica sand, has purchased the property and plant of the Silica Sand Co., Kingston, Ont. It proposes to start work next spring on the erection of a plant on the site of the present buildings, and will also build wharves to ship its product by water.

The Canadian Vickers, Ltd., Malsonneuve, Montreal, is contemplating erection of an addition to its local plant. The company's staff is acting as architects.

M. Leduc, Donnacona, Que., who has the contract for the erection of a \$150,000 paper mill at Portneuf, Que., for the Ruberoid, Ltd., Ville Lasalle, will let sub-trades at once for a one story, 100 x 150 ft. reinforced concrete building.

Link-Belt, Ltd., at present operating in a plant at Wellington and Peter Streets, Toronto, has just completed the erection of a plant on Eastern Avenue where it will carry on the manufacture of elevating, conveying and transmission machinery. It has also acquired the plant of the Elmira Machinery & Transmission Co., Elmira, Ont.

The Avon Pulp & Paper Co., will start work at once on the erection of a mill at Hantsport, N. S., 60 x 500 ft.

The John Godison Thresher Co., Sarnia, Ont., has purchased the local plant formerly occupied by the Perfection Stove Co. and contemplates the erection of a foundry and other buildings.

La Compagnie Electrique de La Sarre, has awarded contract to P. Poudrier, for the construction of a power plant at La Sarre, Que., to cost \$75,000. Z. Langlais, 126 St. Peter Street, Quebec, is engineer.

Western Canada

John Stokeland, New Westminster, B. C., will establish a shipbuilding plant on Lulu Island to cost \$10,000.

The Fisk Tire Co., 342 Seventh Avenue West, Calgary, Alta., has taken out a permit for a \$13,000 addition to its factory.

The Lang Range Co., Seattle, Wash., is planning to build a branch stove factory on Granville Island, Vancouver, B. C. It is understood that a site has been leased.

Bloedel, Stewart & Welch Corp., Ltd., Vancouver, B. C., have purchased 35,000 acres of timber lands on Vancouver Island and will erect a large lumber mill.

The West Canadian Hydro Electric Corporation, Ltd., Vernon, B. C., is planning to build a dam and power plant at Shuswap Falls. Cumming & Agnew, Vernon, B. C., are engineers.

Foreign

THE Ministry of War, Buenos Aires, Argentina, is considering plans submitted by the civil aeronautical department for an airport for the city. About 375 acres will be taken over at Belgrano, about 6 miles from the city. The work will include hangars, machine shops, warehouses and other buildings for both airplanes and seaplanes. A radio station is also planned. The entire project is expected to cost approximately \$4,000,000. The American Consulate, Buenos Aires, Mason F. Ford, assistant trade commissioner, has information regarding the project.

A merger has been arranged between the Norwegian Hydro-Nitrate Works, Oslo, Norway, and the German Badische Aniline Works, Berlin, Germany. The first noted interest contemplates the erection of new plants to represent an investment of about \$2,000,000 with machinery. It is expected to carry out the project within 24 months.

The Portrero Sugar Co., formed under Delaware laws, care of J. A. Sisto & Co., 68 Wall Street, New York, investment securities, is arranging for a bond issue of \$2,000,000, a portion of the fund to be used for the acquisition of the Hacienda El Potrero, operating a cane sugar mill and property near the city of Cordoba, Mexico. The acquiring company has plans for the purchase of additional acreage for sugar cane production and expansion in the mill facilities. Cyrus L. Merriam is president.

The Government of India, Calcutta, is arranging for extensions in its railroad lines and facilities in the vicinity of Burma. During the coming year it is proposed to construct about 650 miles out of a projected total of 1620 miles, with cost at approximately \$8,172,000. Of this sum, slightly more than one-half will be expended for construction and the remainder for rolling stock, shop equipment and facilities, and other open-line works and equipment. The American Consulate, Calcutta, Winfield H. Minor, vice-consul, has information regarding the project.

Officials of the Union Oil Co., Union Oil Building, Los Angeles, and the Atlantic Refining Co., 260 South Broad Street, Philadelphia, are forming a joint subsidiary to be known as the Atlantic-Union Oil Co., Ltd., to operate in Australia and New Zealand. It is planned to construct ocean terminals for storage and distributing service at Sydney and Melbourne, Australia, and at Auckland and Wellington, New Zealand; tank car service will be arranged for inland distribution. The project is reported to cost more than \$3,000,000. J. W. Van Dyke is chairman of the board of the Atlantic company.

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